ELECTRICAL REVIEW

Vol. CXLVI 24th FEBRUARY 1950 No. 3770

Managing Editor: HUGH S. POCOCK, M.I.E.E. *Technical Editor:* W. O. FENWICK, M.I.E.E.
Industrial Editor: J. H. COSENS *Technical Consultant:* C. O. BRETTELLE, M.I.E.E.

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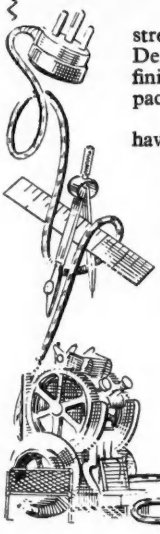
EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (60 lines). Annual Subscription: Home and Overseas £3 6s. 0d.; U.S.A. and Canada $11.00. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW. and crossed "Lloyds Bank." Entered as Second Class Matter at the New York, U.S.A., Post Office.

THROUGH AND THROUGH



The test of Time is no cursory affair. It searches out the strength or weakness of every process in a fire's manufacture. Design, component production, assembly, outside and inside finish—each stage in the long journey from drawing board to packer's bench provides a vital link in the final circuit.

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ELECTRICAL REVIEW

Vol. CXLVI No. 3770 24TH FEBRUARY, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Industrial Design

MUST WE ACCEPT DICTATORSHIP?

BECAUSE we recognize the importance of good design in industrial products, and although we know that this is the objective of the Council of Industrial Design, we are concerned about the future of British design if it is to be led by a Government-sponsored body of this nature.

It is impossible to believe that any radical improvement in the design of British products can be brought about by any attempt of such a body to tell the British manufacturer what he should produce and how he should produce it. We do not go all the way with those who suggest that long hair and a Chelsea address are the principal qualifications required of those who aspire to become Government-sponsored design planners, but we do feel very strongly that no committees, comprising a selection of artists, architects and so forth, can be competent to guide manufacturers in every class of product.

Festival of Britain

The immediate cause of our concern is the way in which examples of British products are being chosen for the 1951 Festival of Britain. A "stock list" of photographs submitted by manufacturers is being prepared and from this the Festival designers and architects will select the products to be shown. It is true that the items selected will be subject to "scrutiny and approval" by Industrial Panels representing the trade interests concerned, but we regard this as an insufficient safeguard.

Competitive marketing in itself should, in normal times, compel manufacturers to produce goods which not only meet the market's standards in quality and performance but also in appearance. If manufacturers are encouraged to listen to the advice and accept the rulings of a small group of specialists, standardization and lack of inspiration will characterize our goods in place of individualism.

Undue Foreign Influence

A suggestion made to us recently by a manufacturer that, to satisfy the design planners, he must employ foreign designers does not convince us that British designers are incompetent, but rather that the planners are unduly influenced by the foreign or unfamiliar type of design, comparing the traditional British trends in design with national trends of other countries and mistaking the latter for originality. It is often the case that foreign buyers prefer the distinctively British design.

By all means let us pursue education in the principles of good design, but when manufacturers cannot show their products at the 1951 Festival of Britain unless they are approved and selected by Committees of the Council of Industrial Design then we feel that this is a form of dictatorship which industry ought to resent and resist.

RURAL ELECTRICITY

As a prelude to the special agricultural issue which we propose to publish on 17th March we print in this issue an article by Mr. W. J. Guscott, of the South Western Electricity Board, outlining the organization necessary for ensuring the proper approach to the farming community, and indicating the nature of that approach. The author wisely adopts as a first principle the need for a service which pays both farmer and supply authority. The problem then is to convince the farmer that the expenditure in which he will be involved is likely to result in increased output (and income) with less expensive effort than is possible with unaided human labour. In this issue, too, we publish some details of the organization set up by the Southern Electricity Board for the extension of its activities in rural areas.

E.I.B.A. IN 1949

Much credit is due to the indefatigable voluntary workers on behalf of the Electrical Industries Benevolent Association for the fact that the target aimed at for 1949 was hit; the total of receipts was £33,611, £611 above the target figure. Nevertheless, relief grants again exceeded £30,000, and so the balance was a small one and would not have existed if the Association had not secured about £3,000 for beneficiaries from the National Assistance Board. Thus there is no possibility of relaxing efforts on behalf of the cause. The cost of living continues to rise and there is still ample room for extended services to the unfortunates of the electrical profession and industry.

POWER IN U.S. MINES

The employment of electric power in coal mining has been increasing rapidly. Studies based on particular, or even a few, years can be misleading whereas data collected annually from more than 400 representative mines in the United States during the past 26 years enable trends to be determined quite accurately. The analysis, illustrated by graphs and tables in the current issue of *Electrical Engineering*, shows that the cost of power to collieries producing up to 5,000 tons monthly is just about twice as much as the average cost to those producing more than 60,000 tons a month. The larger mines are able to maintain better load factors because there is greater diversity in their use of electricity. Thus increasing mechanization enables more energy to be purchased at lower price rates.. Consequently the trend away from private generation has been pronounced. In 1923 some 18 per cent of the coal companies were operating their own generating plant whereas by 1948 this proportion had dwindled to 1.1 per cent.

SCHOOL HEATING CHARGES

Before nationalization the Brighton Electricity Committee, in order to fill in its load curve, offered special terms for the heating of local schools. As a result the Education Committee incurred considerable expense on electrode boilers and other equipment. The Committee has now been told by the South Eastern Electricity Board that the charges are uneconomical and must be increased substantially. It is reported that the Board has even suggested that other heating methods might be used in some schools, and apparently the price increase is so great that the Committee will be forced into this course. It is being suggested to the Board that its proposals are not in keeping with the policy of the former Electricity Committee, whose obligations the Board took over. This seems to be a good point but the Board will probably decline to be bound in perpetuity by pre-nationalization conditions.

SCOTTISH WATER POWER

Last week an important stage was reached in the North of Scotland Hydro-Electric Board's work: the first generating set at Clunie power station, in the Tummel-Garry scheme, was given a test run. There are to be three sets in this station with an annual output of about 143 million kWh. There has been competition between the constructors of this plant and those engaged on the Loch Sloy undertaking. It is hoped that the first set of the latter scheme, situated on the shores of Loch Lomond, will be tested very soon. The commissioning of these undertakings will result in an acceptable addition to the grid supply as well as providing power for the development of the Highlands.

Electricity on Farms

Survey of the Present Position and Future Possibilities

By W. J. GUSCOTT*, A.M.I.E.E., A.M.I.B.A.E.

THE Electricity Boards by Section I, Clause 6 (b) of the Electricity Act, 1947, are required to "secure as far as practicable the development, extension to rural areas and cheapening of supplies of electricity." This problem is not new to the supply industry in which long before nationalization on 1st April, 1948, it was realized that development of the rural areas offered an exceptionally wide field for progressive load building. Indeed, considerable progress had been made before the war, especially in those areas nearer the towns. In the main, however, the larger and more sparsely populated expanses of rural areas remained undeveloped.

Consumer need is sufficiently evident and strong to justify every effort to meet it. The great value of an amenity such as public electricity to the rural communities in general and the farms in particular has never been in dispute, yet, when the National Farm Survey for 1941-43 was published, out of 290,000 holdings of over five acres no more than 78,000 were using electricity. The Survey also made it unpleasantly clear that out of the 78,000 farms with an electricity supply in England and Wales, about 42,000 farms (54 per cent) used the supply for lighting only. Even more significantly, 41,000 (53 per cent) made use of the supply in the farmhouse only. The facts speak for themselves and strengthen the view that in the application of electricity to agriculture there is a great opportunity for two of the country's major industries to become closely associated to the common benefit.

In this article Mr. W. J. Guscott expresses his personal views. They do not necessarily represent the policy of the South Western Electricity Board or its views on the way in which agricultural development can best be handled.

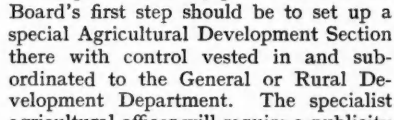
Although fundamentally it cannot be denied that agriculture is our basic and premier industry, a vast number of farming operations, apart from the more specialized work in the fields, are still carried out by old-fashioned methods representing a painful misapplication of labour — labour that beyond doubt is highly skilled in other directions and which could be far more productively employed. Some progressive farmers, of course, have been quick to realize this and with the aid of electricity have mechanized their barn machinery, modernized their byres and dairies and banished irksome drudgery once and for all from the farmhouse. Far too many, however, who already have the supplies connected, do not appear to be aware that electricity offers them the means of increasing the efficiency of their holdings and so achieving maximum production with the minimum effort at the lowest cost.

Whether, as a result of nationalization, costly development in the sparsely populated rural areas will eventually be subsidized by Exchequer grants, inter-

* Section Head, Development Planning and Finance, South Western Electricity Board, one of whose main duties is rural and agricultural development.

area subvention or general tariff increases enabling common connecting terms and farm tariffs to be applied throughout the country, remains to be seen. Meanwhile the Boards within their own areas may be fairly expected to make serious endeavours to meet the pressing requirements of rural communities.

On deciding to launch a serious attack on the problem in any particular area the Board's first step should be to set up a special Agricultural Development Section there with control vested in and subordinated to the General or Rural Development Department. The specialist agricultural officer will require a publicity and sales assistant and one or more technical assistants working together with the



Organization of Agricultural Development Section

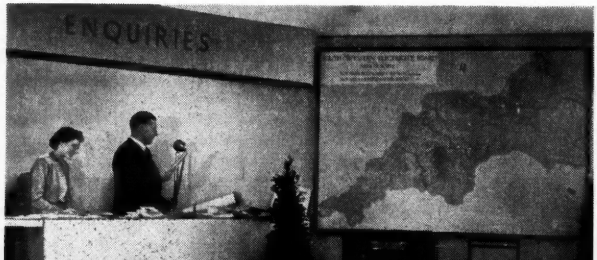
usual clerical staff. Approach to the Board's representatives "on the spot" will be through a Rural Development Department at Sub-Area level, the district commercial officers, branch managers and local representatives. The foregoing chart gives further illustration.

In some areas it may be preferable to have the rural or agricultural specialist officer at District instead of Sub-area level to enable him to have more active personal contact with the farming community. With such a system the approach to this specialist would be through the Sub-Area commercial officer. In areas where the agricultural element is comparatively small the Section would operate directly under the senior rural or general development officer and the need therefore of a purely agriculturalist section head is not so great.

Training Representatives

One of the main functions of the Section will be to train personnel who will make contact with the farmers. These representatives should have a keen liking for agricultural matters and preferably have a farming background that will enable them to talk in the farmer's own language. They will also require a sound practical knowledge of the application of electricity to agriculture and be conversant with wiring practice. An added qualification would be to have a knowledge of modern farming which may well be acquired from short courses at agricultural colleges or farm institutes.

Rural communities and agriculturists must be made aware of the difficulties associated with extending new supplies to rural areas on a large scale. Potential consumers should be told frankly the part they are expected to play in overcoming the difficulties. They should understand that the electricity supply industry, in spite of being under State control, remains primarily a trading organization and that accordingly new



Inquiry bureau at the Devon Agricultural Show last year. Note the microphone for public announcements

extensions must show revenue from sale of electricity sufficient to cover the bare costs of affording the supplies. No secret need be made of the constitution of these marginal costs, i.e., depreciation, maintenance, management, etc., plus the first cost of the energy. That as much as 20 per cent on the capital cost is often required for these purposes should be unhesitatingly revealed.

Only in this way is it possible to explain that when the average capital cost of supplying a farm is between £200-300 the average revenue must amount to about £50 per annum for economic connection. This is far in excess of the average revenue now being obtained from the general type of ordinary farms already connected to the supply in many areas.

The following table gives an idea of the annual average revenues that various items of farm equipment might be expected to yield on an average West-country mixed farm milking 20-30 cows:

	£ s d		£ s d
Farm Buildings			
Lighting	2 0 0	to	3 0 0
Milking	2 10 0	to	4 0 0
Cooling	3 0 0	to	6 0 0
Sterilizing	7 0 0	to	14 0 0
Water heating ..	12 0 0	to	15 0 0
Farmhouse			
Lighting	2 10 0	to	3 10 0
Cooking	7 10 0	to	12 0 0
Wash boiler	1 10 0	to	2 10 0
	£38 0 0	to	£60 0 0

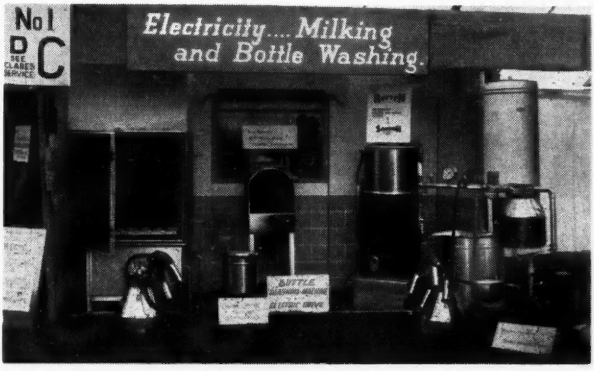
A further sum from £10 to £20 per annum may be obtained from the use of motors, mills, etc., small power machines such as clippers, hoists and pumps about the buildings and of sundry appliances in the farmhouse such as irons, kettles, wireless sets, fires, etc. These figures, when compared with present returns, particularly those in the South-West of England, clearly support the statement that far too little use is being made of the supply and facilities when made available.

The foregoing information is probably best spread throughout the rural areas by lectures to Farmers and Young Farmers' Clubs, Women's Institutes and Guilds, Agricultural Committees, and students in agricultural colleges, training institutes, and schools. Pleasant relations with farming associations and Press should be fostered at every opportunity. Film shows are a profitable and popular means of sowing the early seeds. All publicity matter directed to the farmers should maintain a continual reference to the important fact that successful widespread rural development depends as much on the consumer as on the supply industry.

Displays at Exhibitions

Agricultural exhibitions offer the best general means widely to increase the interest of the farmer, his family and his workers. Supplies to the workers' cottages should always be featured: contented employees mean greater production and the agricultural employee is quick to realize this. Small displays of equipment at small horse shows and gymkhanas afford an opportunity for the local representative to meet all his farming friends. A travelling showroom in the principal market square on market days also commends itself.

Special "Electricity on the Farm" exhibitions will repay the organizing



Agricultural exhibitions offer the best general means widely to increase the interest of the farmer

effort especially if widely advertised. Special written invitations to each farmer within travelling distance are an insurance against poor attendance and usually bring the "right" type. Hay, corn and potato harvest times and county exhibition periods should be avoided in selecting dates. Cooking demonstrations are usually popular with the visiting ladies and if the season is appropriate a sheep-shearing competition or such like for the young farmer using electrical equipment will be an attraction. Formal opening of the exhibition by a prominent agriculturist following an inaugural selected luncheon party, including the Press, serves a useful purpose.

Personal Contacts

There is a real need of, and a place for, electricity within the local economy of any agricultural establishment. To convince the farmer of this requires special care and is best handled by personal calls and discussion from which sales technique cannot be divorced. Correspondence is apt to be put aside or mis-read, but more important, the farmer prefers personal contact. Efforts should be made unobtrusively to interest the farmer and so encourage him to make the first approach. Cold canvassing is rarely successful and is always very uphill work. Inherently the farmer is a business man and appreciates being told the reasons for capital contributions or other similar charges. He is usually ready to accept them if clearly propounded. But he is a busy man and it is wise to call by appointment, preferably at the farmer's own time which is usually in the evening.

Representatives should not hesitate to refer to electrical progress on other farms in the vicinity, for farmers and their wives like to have an eye on the activities of their neighbours with whom they are usually most anxious to keep abreast in matters of development.

The approach should be friendly and natural: the farmer is often reserved and conservative in manner and is unlikely to re-act favourably if the interview is "starchy." Part of the visit will most certainly be devoted to a walk round the farm and buildings and therefore, the farmer should not be made uncomfortable or at a disadvantage by the visitor wearing light shoes and delicate office suits.

The farmer will expect to be given an idea of his particular saving in manpower resulting from the introduction of electrical equipment. He will be interested in the premiums available to producers of higher quality milk. He will expect to be advised on income tax relief on connecting and installation costs, particularly in respect of machinery. The local representative should be capable of readily giving this sort of advice and of expounding the many advantages of electricity in comparison with the older methods, i.e., ease of control, automatic features, greater cleanliness.

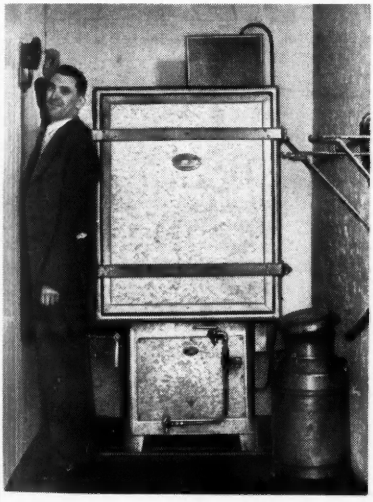
Calls of this type usually settle the business side and the formalities of obtaining a supply and therefore should pave the way for the practical expert to advise on the best means of using it when the farm is connected. This being mainly a matter of offering skilled advice combined with the sale and connection of suitable equipment and appliances requires the service of a local expert. Little can be done from the office or showroom or service centre. The farm must be visited and each case must be handled as dictated by the particular conditions. For

The farmer prefers personal contact rather than canvassing by means of correspondence

instance, whether the supply is single- or three-phase will largely determine the type of equipment. The farmer may prefer to use bruised oats or chaff for feeding, in which case a small hammer mill incapable of handling straw, would probably fail to give satisfaction. Similarly, the farm water supply may be so hard that heat-storage type sterilizers might be preferred to the direct heated type. Considerable loss of power on lengthy inefficient shafting can often be avoided by wise siting of an electric motor. The farmer may be concerned only with obtaining a plentiful supply of water but before sound advice about pumping sets can be given a visit to the site is necessary to ascertain whether the well is deep or shallow, the length of pipe-line, the total manometric head, etc. Again, knowledge of the quantity and condition of water available is also most necessary in dealing with milk-cooling plant.

Need for Prompt Service

Local agricultural engineers, merchants and salesmen have long since recognized that the farmer is a busy man and expects to make frequent use of the telephone and obtain prompt attention to his requirements. If the agriculturist is to reap full advantages of electricity on the farm, he will expect to be entitled to equivalent service from the supply industry. A satisfied farmer can be of invaluable use by "spreading the gospel" among his neighbouring farmers.



After-sales service: The service engineer re-sets the sterilizer time switch in a dairy

Once a farmer installs and becomes accustomed to machine milking, electric sterilizing and cooling, etc., he is entirely dependent upon reliable service. If a breakdown is prolonged, milking of cows and their feeding for example, cannot be delayed until the equipment has been restored to working order. A comprehensive set of spares should be kept as an essential feature of a service scheme. A motor driving any particular machine or an element should, if necessary, be replaceable quickly from stock on a loan basis. Fuse replacements are most important and someone should be made available to handle such failures after normal business hours.

Good service also introduces the need for visits from a skilled maintenance engineer at regular intervals for testing the farm electrical equipment, the wiring installation and particularly the earthing arrangements in the buildings. Such visits result in additional equipment being connected and often bring contacts with neighbouring farmers. They might well be carried out under contract for a fixed annual fee.

In all matters appertaining to agriculture development, advantage can be taken of the valuable services offered by the manufacturers, i.e., lectures to staff about equipment and installation, publicity matter and loan of equipment. Similarly, the wiring contractors may well be brought into the picture. The supply industry must not lose sight of the fact that its major object is to sell electricity and service. Finally, but by no means least, with the facilities of E.D.A. and associated committees and the B.E.A. agricultural advisory service at the beck and call of the Boards, there should be no failure because of lack of expert assistance and guidance in promoting development schemes in the rural areas.

Torquay Floodlighting

The South Western Electricity Board is to be asked to report on the possibility of floodlighting the slopes and beach approach to Petitor Downs, Torquay.

VIEWS on the NEWS

By REFLECTOR

RATHER belatedly, but nevertheless acceptably, the South West Scotland Electricity Board sends me a copy of its 1950 diary to convince me that the London and the North Eastern Boards are not the only ones who have produced diaries. This is handsomely bound in green leatherette bearing the Board's coat-of-arms. Circulation was confined, I am told, to Board members, chief officers and senior officials; I may therefore consider myself fortunate in being given one. Among the special features is a list of private addresses and telephone numbers and a list of Members of Parliament for the Area; the latter may need some correction by the time this note appears. Particulars of meetings are printed against the appropriate dates.

★ ★ ★

Some time ago I commented on the mutilation of old deeds and other documents to provide material for lampshades. A correspondent to the *Manchester Guardian* has revived the point. He says that recently in the window of an antiquarian bookseller he saw an announcement that a large selection of records of great historical and local interest was for sale, "very suitable for making into lampshades." He regrets, as I do, that experts appear to be quite powerless either to forbid the destruction of old records or to acquire them compulsorily for safe custody.

★ ★ ★

Striking evidence of the enthusiasm for television in the Midlands Area was given to me a few days ago by an Electricity Board representative. When a consumer on the fringe of the reception area took advantage of the Board's facilities for demonstrating the apparatus in his own home it was found that, although the sound reception was good, there was no vision. Nothing daunted, the consumer, whose house lay in a valley, suggested that the aerial should be erected at the top of a hill 250 yards away. This was done but the Board's representative unfortunately had only about half the lead-in wire with him. The consumer, however, closed the gap with the aid of some twin wire to the plug point in the house, and the efforts were rewarded by a satisfactory picture—in the middle of a field. I have not yet heard if a sale has been effected and if so what the final installation arrangements are likely to be.

★ ★ ★

Experiments in the electrical killing of whales have been in progress for some time; now I hear of another electrical application in the whaling industry. Whale meat has been put before the public but it cannot be said that it has become generally popular. It is believed that the slightly fishy flavour is to blame for this. The meat is not naturally fishy but sea-water is used for washing the whale. Now it is planned to treat the water electrolytically which will remove the cause of the trouble and, moreover, ensure that it is not subject to bacterial action before the meat is canned.

★ ★ ★

In a recent issue of *The Times* Sir John Pratt told of the reaction of the Chinese when they were introduced to the telephone. After an explanation a Prince Ch'ing said that their classical books recorded something similar which had been used over 2,000 years ago. The Emperor, wishing to communicate with a general at the front, spoke his message into a box. This was conveyed by relays of runners to the general who, when he opened the box, heard the words of the Emperor. Said Prince Ch'ing: "The principle was probably the same as that of this new invention of the West." To me the Chinese invention sounds more like the gramophone than the telephone.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Minister of Fuel and Power announced last week that he had accepted the resignation of **Councillor I. R. Thomas,** a part-time member of the South Wales Electricity Board, who had been nominated as a candidate in the General Election.

Mr. V. N. Jolliffe, A.M.I.E.E., electrical engineer, South Wales Docks, has retired from the service of the Docks and Inland Waterways Executive. Mr. Jolliffe has had forty-three years' service, first with the Alexandra Dock Co., and afterwards with the Great Western Railway, the Railway Executive and the Docks and Inland Waterways Executive. He is succeeded by **Mr. E. R. Radway,** A.M.I.E.E., A.M.I.Mech.E., A.M.I.Struct.E.

Mr. J. Hitchcock, B.Sc., who since 1946 has been personal assistant to the managing director, Mr. Ivon A. Bailey, of Henry Wiggin & Co., Ltd., has now been appointed to the newly created post of assistant managing director. Mr. Hitchcock was formerly a member of the Mond Nickel Co.'s Development and Research Department staff.

Birlec, Ltd., Birmingham, announce the appointment of **Mr. G. P. Tinker** as managing director, in succession to the late Mr. A. G. Lobley. Mr. Tinker has been a director of the company since 1946, and has been a member of the executive staff since the formation of the company in 1927.

An informal lunch, attended by the deputy chairman of the South-Western Electricity Board, Mr. H. Midgley, was given by his colleagues on 17th February, to mark the occasion of the retirement of **Mr. E. W. Tole,** A.M.I.E.E. Mr. Tole received his technical education at Warrington Technical School and was apprenticed to St. Helen's Cable Co., later being associated with the Nuneaton Corporation and the London Underground Railways. In 1913 he was appointed engineer and general manager at Bower Ashton for the North Somerset Electricity Supply Co., controlled by Christy Brothers. Since vesting day he has been senior executive officer of the Board for North Somerset, an area now being divided up. Mr. Frank Christy travelled specially to Bristol to make a presentation to Mr. Tole, who received a radio set and an occasional table from his colleagues. On behalf of the Board, the deputy chairman presented him with an electric chiming clock.

Mr. E. W. Tole

The post of senior lighting engineer at the London District office of the British Thomson-Houston Co., Ltd., has been taken over by **Mr. E. R. Seaden,** B.Sc. (Eng.) Lond., formerly at the company's Birmingham office. Mr. Seaden served his apprenticeship with Brownings Electric Co., Ltd., with whom he subsequently became senior design and development engineer. During the last war he served in various technical capacities with the Admiralty, rejoining Brownings after the war and later being appointed manager and chief engineer of a subsidiary firm. He joined the B.T.H. in December, 1948, as senior engineer, Birmingham district office lighting section.

Mr. E .R. Seaden

M r. H. B. Mellor

Mr. H. B. Mellor, who was previously senior lighting engineer at the B.T.H. Leeds office has joined the Birmingham office as senior lighting engineer, Midlands. Mr. Mellor received his technical education at Oldham and Manchester Colleges of Technology and served his apprenticeship with a firm of Oldham and Manchester electrical Engineers. He is an Associate I.E.E. and has served on the North Midlands Centre Utilization Committee; he is a member of the Association of Supervising Electrical

Engineers, being a past chairman and member of the Committee of the Leeds Branch.

Mr. A. E. McConnell, M.B.E., has retired from the position of manager of the Belfast Office of the Metropolitan-Vickers Electrical

Mr. A. E. McConnell

Mr. S. McCracken

Co., Ltd., and has been succeeded by **Mr. S. McCracken,** M.I.E.E. Mr. McConnell joined the company as an apprentice in 1903, later serving in the Plant Sales, Motor Sales and Export Departments. After active service in the 1914-18 war he returned to Metropolitan-Vickers as senior technical assistant in the Contracts Department and later was appointed manager at Belfast, which position he held for twenty-three years. Mr. McConnell is chairman of W. D. Henderson & Sons, Ltd., Belfast.

Mr. McCracken commenced an apprenticeship with Metropolitan-Vickers in 1915 and gained an M-V scholarship to the Manchester College of Technology. On completing his apprenticeship (which was broken by service with R.A.F. in the 1914-18 war), he became senior tester on dynamo test. From 1925 he was engaged on erection work in India, Burma, Singapore, Russian Turkestan, Central Asia and Western Siberia. He has been at the Belfast office since 1934. He is vice-chairman of the Northern Ireland Centre of the Institution of Electrical Engineers.

Mr. D. Ashton, manager of the Wolverhampton branch of Newey & Eyre, Ltd., is appointed a director of the company.

Mr. J. M. Crowdy has been chosen as the first fellow of the Association of Supervising Electrical Engineers under a new rule which came into effect in 1949. Mr. Crowdy was a founder member and the first chairman of the Association.

Mr. P. T. Houldcroft, B.Sc., of the British Welding Research Association, left last week for the United States where he will study welding of light alloys, in particular fusion welding, for three to six months at Rensselaer Polytechnic Institute, Troy, New York, and for a further period (making a total of one year) in various industrial concerns. These arrangements were made by the Economic Co-operation Administration in the form of a scholarship.

Mr. E. Bright has been appointed technical sales representative of Machine Tool Electrics, Ltd., for the Yorkshire area and takes up his new appointment on 1st March. Mr. Bright has been sales engineer at the Leeds office of the Igranic Electric Co., Ltd. His address is 27, Lingwell Avenue, Leeds, 10.

Mr. J. Appleby, chief engineer, P.W.D. (Electricity) Lahore, Punjab, informs us that he is expecting to arrive in this country this week for about a month's stay in connection with important electrical projects in the Punjab. His home address is White House, Abberton, Colchester.

Mr. S. L. M. Barlow, Associate I.E.E., chairman and managing director of Barlow & Young, Ltd., and a director of other electrical concerns has just returned from a five-week business tour of the West Indies, where his company has a number of contracts in hand. Included among these are installation contracts for the large rebuilding programme in the business centre of Georgetown, British Guiana, which was destroyed by fire in 1945.

Mr. H. McNeil, B.Eng., M.I.Mech.E., M.I.E.E., general manager of Babcock & Wilcox, Ltd., has been appointed a director of the company.

Mr. John R. Pheazey, M.I.Mech.E., M.I.P.E., works director of Standard Telephones and Cables, Ltd., and vice-president and European director of manufacture, International Standard Electric Corporation, has been elected president of the Engineering and Allied Employers' London and District Association.

Mr. P. E. Painter, chief cashier in the English Electric Co.'s London office at Queens House, Kingsway, since 1934, retires at the end of February. Mr. Painter joined the secretarial staff at Willans & Robinson's in 1907, and in 1920 went to Queens House as joint company registrar. At a gathering in Queens House on 16th February, Mr. Painter was presented with a cheque, subscribed for by members of London office staff and by many other "English Electric" friends.

Frederick Smith & Co., Ltd., held their annual social evening on 27th January at the Broughton Assembly Rooms, Manchester. The programme included modern and old-time dancing, a cabaret and competitions. About 400 members of the company and their friends attended the pantomime *Babes in the Wood*, at the Palace Theatre, Manchester, on Friday last.

The annual children's party of employees of the **Liverpool Electric Cable Co., Ltd.,**

took place recently in St. John's Hall, Bootle. There was a pantomime, *Mother Goose*, a marionette show, a tea and gifts to each child. During the afternoon prizes given by Mr. W. J. Terry (managing director) and the bowling and football clubs were balloted for amongst the children.

On 11th February the annual staff dinner of the **Electric Construction Co., Ltd.,** Wolverhampton, was revived, at the Wulfrun Hall. Mr. W. M. B. Furniss (assistant managing director) presided over a large gathering comprising the full board of directors and members of the administrative, technical and commercial staffs. The toast of "The Electric Construction Co., Ltd.," was proposed by Mr. J. C. Milne, and replied to by Mr. W. M. B. Furniss. Mr. W. Tonkinson (director and chief engineer) proposed the toast of the staff, and Mr. E. H. Vincent (works manager) responded. The health of the chairman of the company, Mr. W. M. Furniss, was proposed by Mr. W. G. Cliff, and Mr. Furniss responded. The second half of the evening was filled by an entertainment provided by members of the staff.

The annual staff dinner of **Abell & Smith's Electrical Co., Ltd.,** was held recently at the Guildhall, Worcester, Mr. H. Horton Smith (managing director), presiding. Mr. A. Parkinson (Crompton Parkinson, Ltd.), proposed the toast of the company and referred to the high position which it held in the electrical contracting world. Mr. H. F. Wilkins (director and secretary), in responding, mentioned that the firm was formed nearly forty-five years ago. Many of their employees were shareholders in the company. Mr. G. C. Tydoe proposed the toast of the visitors, to which Mr. R. Randall (Midlands Electricity Board) and Mr. W. J. Bird (G.E.C.), replied. During the evening long-service certificates were presented.

The dramatic section of the **British Insulated Callender's Cables, Ltd.,** Athletic & Social Club ("21 Theatre Group"), presented Noel Coward's "This Happy Breed" to a packed house at the Cripplegate Theatre on 17th February. This was the Group's first production since the war, and the performance received an enthusiastic reception.

OBITUARY

Mr. J. W. Ronchetti.—The death occurred on 12th February, at the age of sixty-five, of Mr. J. W. Ronchetti, who had been engaged in the electricity supply industry since 1912 when he joined the Cleveland & Durham Electric Power Co. In 1917 this company was absorbed by the concern which later became the North-Eastern Electric Supply Co., Ltd., and Mr. Ronchetti continued to be associated with power station engineering developments on the north-east coast, eventually becoming the supervisor of the economy section. At vesting date he was appointed senior assistant to the chief generation engineer (operation), North-Eastern Division, British Electricity Authority, which position he held at the time of his death.

Mr. E. B. Percival, manager of the Wellingborough Electric Supply Co., from 1921 to 1937 has died at Bournemouth at the age of sixty-six.

Mr. W. T. Dalton.—The death has occurred at the age of seventy of Mr. William Thomas Dalton, former chief engineer of the Newcastle-on-Tyne City Transport and Electricity Department. He was with the department for forty-one years.

Sir Thomas Purves.—On 15th February a memorial service to the late Col. Sir Thomas F. Purves was held at the King's Chapel of the Savoy, London, W.C.2. The service was conducted by Prebendary W. L. Cottrell and the large congregation included representatives of all organizations of the electrical profession and industry including the Institution of Electrical Engineers, the Post Office and the Cable Makers' Association, with which Sir Thomas had been connected during his lifetime.

WILLS

Professor C. L. Fortescue, Emeritus Professor of Electrical Engineering, Imperial College of Science and Technology, President of the Institution of Electrical Engineers in 1942, who died on 22nd Sept. last, left £18,824 gross (£18,694 net).

Mr. W. G. Pye, founder of Pye, Ltd., who died on 13th Oct. last, left £46,050 gross (£45,558 net).

I.E.E. North-Western Centre

WE have already referred to the outing which the North-Western Centre of the Institution of Electrical Engineers is holding in May to celebrate its Jubilee year. Another event which has now been arranged is a Jubilee Exhibition which will be held at the Manchester Central Library from 6th-26th March. The exhibition will illustrate the progress and history of electrical engineering in the North-West and the part played by the North-Western Centre. Mr. L. H. A. Carr has written an historical record of the inception and growth of the Centre, and this will be available in book form at 2s 6d per copy.

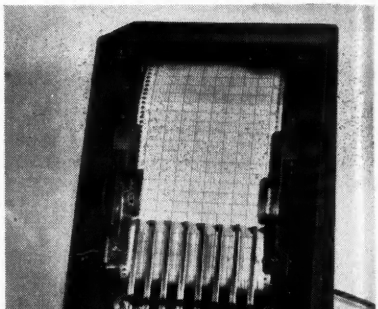
Operations Meter

New Ministry of Works Design

A NEW instrument has been made available for recording the frequency of operations and the times at which they take place. The design was produced by the Chief Scientific Adviser's Division of the Ministry of Works to record the opening and closing of doors in connection with a study of the occupational pattern in buildings, but it is equally suitable for recording other types of operations. The instrument was developed and is manufactured by Hendrey Relays, Ltd., of Slough, Bucks.

From the appearance of the instrument it will be evident that, in the present design, eight pens are incorporated. Each pen traces a straight line on a moving chart, the line being displaced by a small fraction of an inch at each operation by the opening (or closing) of the electrical circuit associated with the pen.

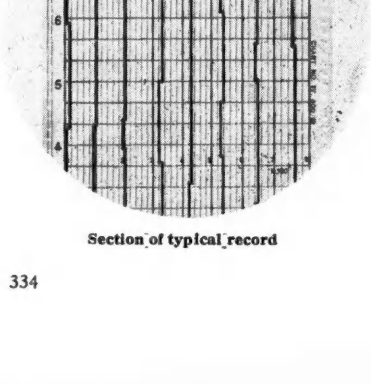
The chart moves at a constant speed of one inch an hour and each chart roll lasts for about one month. The speed is, however, adjustable by alteration of the driving sprockets.



Eight-pen "operations" graphical recorder (with front cover of instrument removed)

For changing the chart, or servicing the instrument, the pen unit is hinged and each pen with its electrical equipment is easily removable, if required. All electrical connections are readily accessible.

At present the instrument is designed to operate at mains voltage, while the pen units are actuated from a 24 V d.c. source, but it could, if required, be modified to operate entirely at mains voltage.



Section of typical record

"Pioneering in Space"

SINCE 1922 the Radio Division of Standard Telephones & Cables, Ltd., has been a pioneer in broadcasting, communications and radio direction finding. The company has now issued a well-produced booklet, "Pioneering in Space," in which it surveys the radio research and development which it has carried out since 1922 when the American Telephone & Telegraph Co., in collaboration with the British Post Office and the Western Electric Co., Ltd. (now Standard Telephones & Cables, Ltd.), carried out a series of tests and observations in order to establish a reliable telephone link across the Atlantic.

Installation Incentives

Raising Efficiency in the Electrical Contracting Industry

By L. A. Ferney, B.Sc., M.I.Mech.E.

AN investigation of the work of electrical contractors was undertaken recently with the object of finding means for: (a) increasing the efficiency, productivity and profit-earning capacity of the electrical contracting industry; (b) increasing the earnings of its workers; (c) reducing completion times of individual jobs and of the prices charged to the consumers.

The expected benefits should accrue mainly from increased turnover of individual firms, while the labour force and the overheads of each remain constant. It is assumed that the volume of work available at present, together with new work secured by speedier completion of contracts and lower prices, will keep the whole of the present qualified labour force employed for many years to come.

In its last two awards relating to wages in the electrical contracting industry the National Arbitration Tribunal has urged the industry to institute some sort of "payment by results" system. Electrical installation work does not lend itself very easily to such a scheme but the subject should be discussed. Whether the author's scheme forms a suitable basis or not it is an approach deserving consideration

The present scheme is based on the results of trial investigations covering four sites: two office buildings and two factories; of each pair one was a new installation and the other a re-wiring job. The field work took two weeks and was carried out by an experienced engineer, who used time study as the principal means for the investigation and for the subsequent analysis. In time study every job is split into its component elements which are then separately timed; an incidental advantage of this method is that elements which are common to many types of jobs in a trade are clearly discernible.

The sites covered in the pilot investigation do not form a representative sample of the whole industry, yet the results obtained from them indicate the general lines on which a wider survey should be based and the kind of results to be expected.

It is quite certain that productivity, and consequently the earnings, can be much increased and that the bulk of the jobs which the industry has to carry out consist of only a few types of work elements. Thus, much of the work consists in drilling and plugging holes, and in the securing of bolts, nuts and screws. A financial incentive scheme would admirably meet most of the objectives set out in (1). Furthermore, such a scheme would considerably simplify many other aspects of management automatically, since the data it provided would allow accurate and simple tendering, planning and costing.

It is possible to devise a scheme of management of individual enterprises covering the whole industry, provided both sides of it can be convinced that they will each gain fairly from it. Since the work pattern is simple, the scheme would also be simple, inexpensive and quick to introduce.

Electrical contracting possesses several important characteristics: The average firm is small; the number of firms in the industry is large; entry into the industry is easy; many entrants are former workers and foremen; every year there are many liquidations of contracting businesses.

The work of the industry is of several generic kinds: Wiring of buildings in

course of construction; wiring and rewiring of existing (occupied) buildings; maintenance of wiring and of electrical machinery by contract; *ad hoc* repairs; breakdown service.

For these reasons electrical contracting lacks the homogeneity, coherence and uniformity of standards which could earn it the title of an industry in the strict sense. This in no way detracts from its importance as the handmaiden of its parent (electrical distribution) industry, but it should serve to explain the belief that in such an industry there is bound to be a very considerable range of managerial ability, quality of workmanship and of profitability, and hence that it stands particularly to benefit from the introduction of standardized, rational management techniques.

Responsibility for Workmanship

Both sides of the industry are keenly aware of the responsibility resting on them to provide safe and sound wiring, and thus to protect the public against accidents and hazards, and of the fact that the existing regulations do not fully cover all hazards. In practice, these responsibilities are met largely by placing workers on their honour to produce work of a certain degree of quality, and by visual and somewhat random inspection. The few available functional tests cover but a small number of quality attributes, and there is as yet no comprehensive body of knowledge on the quality of electrical installation work to develop a statistically valid quality control system.

This unilateral placing of responsibility for workmanship is one of the basic weaknesses of the majority of non-factory trades and is supposed to militate against the introduction of any production incentives, or of any other means of speeding up work, in case they lower the standard of workmanship.

Nevertheless, available evidence indicates that increased productivity marches with enhanced quality, rather than the other way round. In many cases incentive schemes have been introduced with the primary object of improving quality and in some cases have been followed automatically by higher productivity.

Even if we choose to disregard such evidence, it can still be logically argued that an incentive scheme, which takes care of the productivity of the workers, will relieve the supervisors of that worry and will thus free them to concentrate on quality control, thus improving standards of workmanship.

The basic principles of management are universally applicable, the cardinal one being work measurement. Work measurement rests on the assumption that every job has a given "work content"; hence the time of its completion by an "average" worker can be assessed with reasonable accuracy. Full recognition is given to the social and psychological factors. The true motivations of workers and employers are determined and suitable incentives are thereupon provided to both sides of the industry. Performance in excess of the average must be rewarded proportionately.

It is held that it is possible to study the trade as a whole, to determine all its basic "work values" and to prepare a "vocabulary" of these; to find the laws in accordance with which sets of "work values" (allowed times) will change with site and other conditions; to codify these laws which will then form the "syntax" of the proposed management system. It may still be necessary to apply individual attention to firms wishing to install the system. But this would be brief and inexpensive compared to the benefits to all participants.

Values for Work Elements

The vocabulary will be compiled from time studies carried out at a number of representative sites under fully described "standard" conditions and it will be divided into a number of technical sections, e.g., wiring, cabling, conduit work, drilling and plugging, etc. Each section will contain all the appropriate work elements. For each element a series of values will be given as a function of size. Where alternative methods of carrying out the element are in existence, each method will be given a series of allowed times.

There are various short cuts to cover a range of sizes; some of these are graphical. The method is sufficiently flexible to make allowance for changing techniques. An imaginary example in electrical contracting is given below:—

Conduit Section: the bending of conduit through 90 deg. This is a fairly

typical example of a work element. Assume that there are two alternative processes—cold and hot bending. This implies that two sets of allowed times must be given, one for each variety. For each set, times will be determined for 4-6 sizes (diameters). These are then plotted against the sizes and a curve drawn through the points. Intermediate values will be read off the curves. Some extrapolation of the curve is also permissible.

Factors of Uncertainty

The syntax will consist of three main parts: The first will deal with overall aspects of the trade and varying conditions due to differences in sites, etc. Since contractors' work is carried out on clients' premises it is subject to various factors of uncertainty, which will modify the vocabulary work values. These factors must be determined and numerical values assigned to them. It is hoped that it will be possible to express them as simple multipliers (safety factors).

Several of these factors come to mind, as follows:—The *geographical* factor, i.e., whether the site is rural, urban or metropolitan. The *sub-contracting* factor which should take care of delays due to the unreliability of the main contractors' promises; its value in individual cases will depend on previous experience with the main contractor in question, the general supply position in the building trade at the relevant time, etc. The *building* factor, which will express the main difference between (a) buildings in course of erection; (b) completed unoccupied buildings; (c) completed occupied buildings. The *architectural* factor will express changes in values ascribable to the nature of the building: Single or multi-floor; industrial, office or domestic; open floors or largely subdivided.

These factors will be also of considerable assistance in standardizing the methods of tendering and may thus be of considerable value for their own sake.

The second part will deal with the wider aspect of the work involved at sites: optimum sizes of teams, best sequence of working operations and scheduling the work at any site.

Control and Costing

The third part will deal with methods of evolving and applying incentive schemes; the analysis of lost time and shortfalls in schedules. In general this section will indicate how the plans laid in accordance with the previous sections can be controlled and carried out to time. Furthermore, it will explain how accurate costings can be obtained from the bonus calculations necessary for the incentive schemes. The clerical routines will be explained and their simplification ensured.

The proposed management engineering scheme will be designed to look after many functions of a business—tendering,

Table I.—Summary of Basic Operations in a Typical Installation.

Sequence of Erection Procedure	Basic Operations 1	2	3	4	5	6	7	8
	Bore hole for screw or bolt	Position and secure fitting	Position and secure cable or conduit clamp	Bend conduit	Screw conduit	Position and secure conduit or heavy cable with saddle	Run cable through conduit or secure by cleats	Fix connection leads
Set up angle iron frame for distribution board	×	...	...	...	...	...	...	...
Mount and connect main switch and bus box	×	×	...	...	...	...	...	×
Mount and connect distribution boxes	×	×	...	×	×	...	×	×
Run conduit to sub-circuit fuse boxes	×	...	×	×	×	×	...	...
Mount sub-circuit fuse boxes	×	×	...	...	...	...	...	...
Run cable through conduit to s.c. fuse boxes	...	...	...	...	...	...	×	×
Run conduit to points and switches	×	...	×	×	×	×	...	...
Run cable through conduit or (omitting 7) by cleats to points and switches	...	...	...	...	...	...	×	×
Fix points and switches and connect	×	×	...	...	...	...	...	×
Connect supply through meter to main switch	×	...	×	...	...	×	...	×

scheduling of contracts, scheduling the total labour force, determining optimum team sizes, controlling plans (schedules), increasing productivity, reducing completion times of contracts and increasing individual earnings.

When these functions are carried out properly the annual turnover and profit should be increased, employees' goodwill improved and the public will be faithfully served.

APPENDIX

Details of the Preliminary Survey Findings

The survey clearly indicated that the pattern of work entailed is reasonably alike for all the contracts analysed, though the working conditions varied considerably in each case.

The typical a.c. installation for a small factory or block of offices, starts from a switchboard with main switches, busbar chamber and a series of ironclad distribution boxes. Thence power is transmitted to various sub-distribution boxes and on to numerous lighting and power points.

Four types of cables were encountered—armoured; braided v.i.r. running through conduit; lead covered; or tough rubber covered.

Fastening of cable or conduit to walls, ceilings, floors, etc., is made with standard saddles and cleats spaced at recognized distances, and demands the drilling (and plugging) of holes for fixing screws. Lighting and power units, small switches and distribution boxes are also fixed by screws. In the course of his work, an electrician constantly repeats the operation of "drill hole and fit screw." From a wide range of studies taken on this operation, a comprehensive set of work values can be compiled to cover "fixing" in all types of materials and a variety of situations.

Other examples of "basic operations" are the bending and fitting of conduit and the fixing of connector leads.

The electrician is rarely allowed to proceed with his work for long periods without interruption from the occupants of the building. Also, on "re-wiring" jobs, considerable temporary wiring has to be erected to ensure a continued supply during the change-over.

Values for Basic Operations

However, these variations in working conditions can be classified and a factor applied to the work content value of a job to compensate for unavoidable lost time and for special conditions. The schedule in Table I (p. 337) is a summary of the basic operations involved in a typical installation and their occurrance in the erection procedure.

Table II.—Possible Variations in Basic Operations.

Basic Operation	Conditions governing variations in work content	Est. No. of Variations per Op.
1. Bore hole for screw or bolt.	Material in which hole is bored, i.e., wood, plaster, steel, brick, concrete (medium and hard). Size and depth of hole.	12
2. Position and screw fitting.	Size and weight. Location, i.e., floor level, standing height, ceiling height.	18
3. Position and secure cable or conduit clamp.	Whether saddle or cleat. Location, i.e., floor level, standing height, ceiling height.	6
4. Bend conduit.	Whether an angle bend or a "set." Size of conduit (average 2).	4
5. Screw conduit.	Screwing for "runner." Screwing for tee or elbow. Size of conduit (average 2).	4
6. Position and secure conduit or heavy cable with saddle.	Location: Below floor level, floor level up to standing height (normal), above standing height, on ceiling. Size of conduit or cable (average 4).	16
7. Run cable through conduit or secure by cleats.	Proximity of bends. Number of wires. Whether conduit or cleats. Size of wires.	4
8. Fix connection leads.	Size of cable. Type of connection.	10
Total Estimated Variations.....		77

Sets of values for the foregoing basic operations can be compiled to satisfy a variety of conditions peculiar to each one. Details of these conditions are set out in Table II.

As will be seen, it is estimated that a total of some 70 to 80 operation values are required to cover the variations outlined. A broader survey might yield some 150 values. These values would be the basis for calculating the "work content" of any installation job. Allowances for the fitting-up of temporary wiring and the stripping of old circuits could also be calculated on comparable lines, with groups of values established for a variety of conditions.

Agricultural Development Staff

Organization Completed by the Southern Electricity Board

THE Southern Electricity Board has now completed the organization of an agricultural development staff, which will enable all food producers throughout the Board's Area of 6,528 square miles to obtain the services of specialists in the applications of electricity to agriculture and horticulture.

In the Newbury Sub-Area, which contains the largest rural territory, an agricultural representative has been appointed to each of the Districts of Reading, Oxford, Swindon, Melksham and Newbury. In the Bournemouth Sub-Area, an agricultural representative has been appointed to each of the Districts of Yeovil and Salisbury and an appointment of one representative has been made to cover the two Districts of Lyndhurst and Southampton. Also, for geographical reasons, Bournemouth and Weymouth will, for the time being, be covered by one representative.

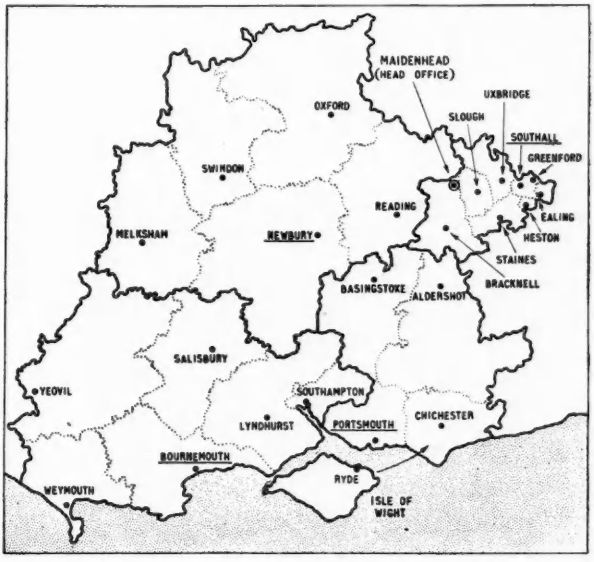
In the Portsmouth Sub-Area, each of the Districts of Basingstoke, Aldershot and the Isle of Wight has a representative, but the Districts of Chichester and Portsmouth will be served by one representative, owing to the comparatively small rural territory in the latter District.

At each of these three Sub-Area offices an agricultural assistant has been appointed who will keep in close touch with the District representatives on the usual problems and assist particularly with the unusual ones.

In the remaining Sub-Area, Southall, conditions are different from those in the other three in so far as it is geographically small and contains a high proportion of industrial load; nevertheless, an agricultural assistant has been appointed to give specialist service to the 1,000 or so farms and many horticultural concerns within the Sub-Area.

The general activities of the agricultural staff will be co-ordinated through the Sub-Areas at the Board's headquarters, in the Chief Commercial Officer's Department, by the agricultural development officer, Mr. H. R J. Baigent, M.I.E.E., M.I.B.A.E.

The Board appears to have brought together an excellent team, ready to give



Location of Sub-Area and District agricultural representatives. The head office is at Maidenhead. Sub-Area offices are underlined and, with the exception of Southall, include the District offices

the best possible service to farmers and market gardeners. It is intended to work in the closest co-operation with the National Agricultural Advisory Service and to offer facilities for education in electricity and the use of equipment to agricultural colleges and schools. County Agricultural Institutes, Farming Clubs and Young Farmers' Clubs, use being made of all forms of visual aids, sound films, film strips and slides.

The Southern Board has a large rural territory inherited from undertakings familiar with rural development and, in the majority of the Districts and branch offices, the staffs are well accustomed to dealing with the needs of the farming community. The new organization will further improve the facilities.

There are approximately 20,000 farms in the Board's area, and of these 55 per cent are already on the mains. Since Vesting Day farms have been connected at an average rate of 119 per month.

ELECTRONIC FLASH TUBES

THE range of electronic flash tubes made by Mullard Electronic Products, Ltd., has recently been extended to include many special tubes designed for particular applications in industry and research.

Among these are a number of tubes of linear form which are primarily intended for use in the field of pure research for photographing ion-tracks in Wilson cloud chambers. These tubes can also be used where a line source light flash of high intensity and uniform quality is required, tubes LSD 17 and LSD 14 being representative of the large range of tubes which have been developed for this class of work. The tubes are all basically similar in design, differing only in length, light output and ultra-violet response. Straight tubes, however, being either glass or quartz with flash paths differing from those provided by the standard range, can be specially made.

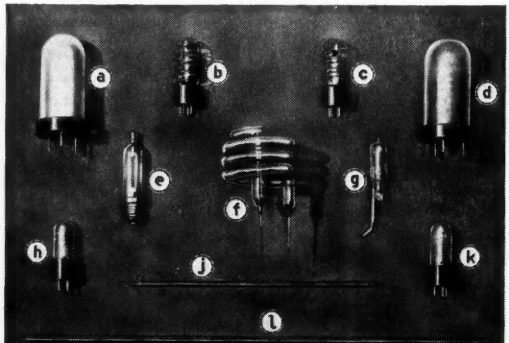
Another recent introduction to the standard range is the LSD 9, which has been specially designed for ultra-violet irradiation and is capable of producing a single flash of 1,000 joules; the mechanism of this tube is similar to the 200 joule type LSD 7, but a protective cage surrounds the quartz spiral.

For photographic applications where light intensities of the highest order are required, a 10,000 joule tube, LSD 10, is being made. This can be used for photographing a complete stage or film set and, no doubt, has potentialities for lighthouses or beacons.

Another interesting tube is the LSD 8, which is intended for use in stroboscopic instruments. In practice it has an advantage over neon tubes in that the light produced approximates closely to daylight, whereas the light produced by neon tubes is predominantly red. This means that it is eminently suitable for the stroboscopic examination of fast-moving coloured articles such as textiles or paper, or for the mass-production balancing of small motor armatures. It has a maximum flash repetition frequency equivalent to 30,000 r.p.m. and a continuous rating of 30 W.

Other additions to this range of products include the water-cooled tube, LSD 6, for stroboscopic examinations in which a particularly compact light source of high intensity is required; and the LSD 5, which is a 1,000 joule version of the stroboscopic tube LSD 4.

Apart from the already comprehensive range of standard flash tubes described, the company is now in a position to manufacture flash tubes to order.



Mullard electronic flash tubes

(a) LSD4 (400 joule); (b) LSD8 (stroboscopic); (c) LSD9 (1,000 joule u.v.); (d) LSD5 (1,000 joule); (e) LSD2 (microflash); (f) LSD10 (10,000 joule); (g) LSD6 (water-cooled compact source); (h) LSD3 (100 joule); (j) LSD17 (12 in × 4 mm quartz); (k) LSD7 (200 joule); (l) LSD14 (24 in × 6 mm glass)

French Railway Electrification

Single-Phase 20,000 V System

THE 48-mile railway line from Aix-les-Bains to La Roche-sur-Foron, on the Chamonix route, is now being electrified by the French National Railways at 20,000 V 50 c/s single-phase in an attempt to evolve a system of electrification which will be cheap enough to apply to secondary lines where traffic is not of sufficient density to warrant the French standard 1,500 V d.c. system.

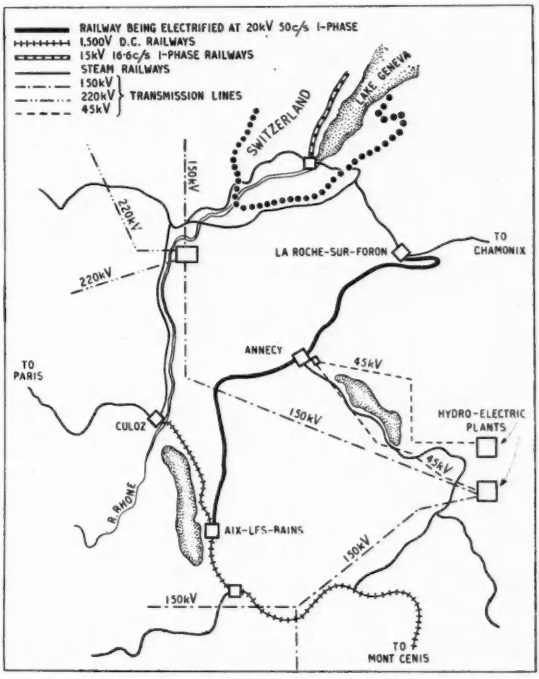
It is hoped to get the required results by the high-voltage higher-frequency system, because although the locomotives are more costly, the fixed equipment is estimated to be only half the price of that on 1,500 V d.c. conversion. The line chosen for this first new electrification has not a particularly high traffic density, but occasionally there are numerous holiday trains. Some estimates have indicated that a return of 6 per cent on the capital invested may be gained.

From two comparatively nearby hydro-electric stations, three-phase current at 45 kV is fed into the one substation on the line, which is located at Annecy and from which there will be two outgoing single-phase feeders, one towards the north and the other towards the south, with a neutral section between. Eventually, when all traffic is operated electrically, the intention is to feed from the Annecy substation to points at each end of the line.

At the south-western terminus, Aix-les-Bains, the single-phase h.v. system will be connected to the 1,500 V d.c. Culoz-Modane main line, which is the heavily graded section of the Mont Cenis route to Italy. Special arrangements will be needed here, including the provision of a neutral section between the a.c. and d.c. catenary systems.

As a commutator motor is the only acceptable type of machine for traction work, much consideration has been given to its design, for commutation problems increase with the frequency and have hitherto limited the use of frequencies other than 16.6 or 25 c/s, except for the Höllental railway in the Black Forest and the Kando system in Hungary.

Three locomotives have been ordered, initially by the French National Railways two of which are to be driven by single-phase motors. The third locomotive is to have a rotary group comprising an asynchronous motor fed by a.c. and driving directly a d.c. generator which will feed the traction motors. It is considered that this second method has become practicable because of the reduction in specific weight of these machines during recent years.



General layout of the Aix-les-Bains to La Roche-sur-Foron Railway in France

Loop Tests

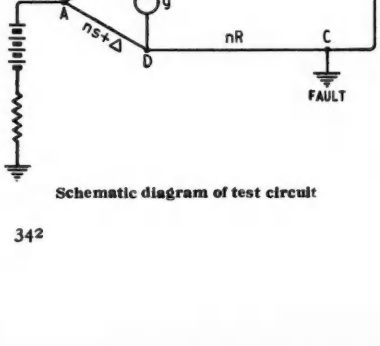
Fault Localization on Low and Medium Voltage Cables

By G. W. STUBBINGS, B.Sc., A.M.I.E.E.

THE Murray loop test with a slide-wire bridge is rightly esteemed for the localization of faults in moderate lengths of low and medium voltage cables because, being a null method, its accuracy does not depend upon the accuracy of an indicating instrument. One source of error in the calculation of the fault position from the result of this test arises from the insensitivity of the galvanometer as a null indicator and the fact that a definite voltage on its terminals is required to produce an observable indication.

The direct calculation of the error in the calculated fault position with an assigned value v of this voltage in terms of the resistances of the branches of the bridge network can be arrived at by the application of Kirchhoff's laws. If the reasonable assumption is made that the resistance of the fault plus any limiting resistance in series with the battery is much greater than the resistance of the slide wire or cable loop, a simple formula for the possible error can be easily worked out by using Thévenin's theorem.

In the schematic diagram of the test circuit BAD is the slide wire of resistance S, BCD the cable loop of resistance R and BD the galvanometer branch of resistance g. With the bridge in balance



Schematic diagram of test circuit

A divides the slide wire into two fractions n and $(1 - n)$, while C divides the cable loop in similar fashion.

If the bridge is put slightly out of balance, as indicated in the diagram, by an amount Δ of slide wire resistance just sufficient to give an observable deflection of the galvanometer, the resistance of the branch AD becomes $ns + \Delta$ and the p.d. between B and D will be v. If I is the current entering the slide wire at A then this current will be sensibly constant for all positions of the contact A. Furthermore, if the galvanometer branch BD is short circuited the current in AB will be $\frac{ns + \Delta}{S} \times I$ and the current in BC will be nI so that the current I_s in the short circuit will be $I\left(\frac{ns + \Delta}{S} - n\right) = I\frac{\Delta}{S}$.

Also, by Thévenin's theorem, the current I_s in the short circuit will be the original p.d. of B and D, or v, divided by the combined resistance of all the paths between B and D. As the bridge is nearly in balance and the total resistance in the battery branch is large this combined resistance will be that of S, g, and R in parallel.

Therefore $I_s = v\left(\frac{1}{S} + \frac{1}{g} + \frac{1}{R}\right) = I\frac{\Delta}{S}$

and $\frac{\Delta}{S} = \frac{v}{I}\left(\frac{1}{S} + \frac{1}{g} + \frac{1}{R}\right)$, which is the fractional error in the estimation of the fault position and it is equal to the actual error divided by the length L of the cable loop in yards. We therefore have,

$$\text{error in yards} = \frac{v}{I}\left(\frac{1}{S} + \frac{1}{g} + \frac{1}{R}\right) \times L.$$

This formula shows that if S and g are considerably greater than cable loop resistances, then, for assigned values of v and I, the possible error in yards is proportional to the cross sectional area.

Overseas Electrical Trade

Highest Exports Since June

ALTHOUGH the total of electrical apparatus and machinery in January at £10,966,253 was the highest since last June, it was still £½ million below the figure for January last year, which was, however, an all-time record. The decline, compared with the corresponding month of 1949, was confined to electrical goods and apparatus, vacuum cleaners and other electrically operated portable appliances: actually shipments of electrical machinery showed an advance from £3,861,106 to £4,251,581. An additional classification now enables us to include the figures for portable electric tools, exports of which increased from £52,650 in January, 1949, to £91,201 last month.

Taking exports of electrical goods and apparatus as a whole, probably the most striking feature was a decline in shipments to India, last month's total of £521,879 being about a half of that of the corresponding month last year. South Africa took £707,017 worth compared with £947,272 and Pakistan £64,487 (£109,554).

On the other hand there were substantially bigger purchases by Australia £1,007,243 (£711,937) and New Zealand £402,022 (£298,015), while, though comparatively small, trade with the United

TABLE I.—ELECTRICAL EXPORTS

Class	Jan., 1950	Jan., 1949
	£	£
Telegraph and telephone cables and wires (submarine)	41,097	49,237
Ditto, not submarine	737,660	536,070
Wires and cables, cotton, silk or artificial silk insulated	53,875	113,380
Ditto, enamel, glass or asbestos insulated	60,845	80,416
Ditto, paper insulated	614,129	808,633
Ditto, rubber insulated	273,401	646,350
Ditto, other	82,772	98,468
Commercial radio apparatus	425,927	216,615
Domestic radio apparatus	196,999	297,597
Telegraph, telephone and signalling apparatus	1,256,287	1,333,108
Radio loudspeakers	32,163	54,953
Sound reproducing apparatus, component and parts other than cinematograph apparatus	271,508	252,700
Other sound reproducing apparatus	57,676	56,252
Radio valves	199,452	178,582
Electric lighting carbons	10,184	8,992
Lamps not exceeding 24 V	31,743	41,487
Discharge lamps	47,818	26,623
Other lamps	93,093	92,174
Other lighting apparatus	327,557	512,574
Primary batteries	63,346	83,581
Parts, other than carbons	17,477	14,979
Accumulators for motor vehicles	184,883	151,295
Ditto, traction	20,115	5,082
Ditto, radio	4,518	2,207
Other portable accumulators	38,827	64,548
All other accumulators	37,919	46,254
Parts and accessories	80,993	64,508
Cooking appliances	66,139	153,721
Heating appliances	57,435	73,706
Parts and accessories for cooking and heating appliances	54,485	47,130
Flat irons	31,423	40,422
Commercial electrical instruments	103,898	99,567
House service meters	90,896	186,937
Time recorders and time switches	13,021	7,061
Other electrical instruments	85,770	65,594
Electro-medical apparatus (not X-ray)	36,125	39,419
X-ray apparatus, tubes and parts	40,349	104,479
Permanent magnets	18,122	13,387
Insulating cloth and tape	73,968	103,595
Other insulating materials	85,094	87,278
Unclassified electrical goods and apparatus	417,905	455,522
TOTAL electrical goods and apparatus	6,436,894	7,314,483
Generators, up to 200 kW	1,123,036	677,007
Ditto, over 200 kW	170,517	478,628
Ditto, parts	143,263	208,388
Motors, railway and tramway	32,970	22,250
Ditto, other, not over ¼ h.p.	57,575	151,011
Ditto, over ¼ h.p. but under 1 h.p.	35,110	79,975
Ditto, from 1 h.p. to 250 h.p.	515,981	612,236
Ditto, over 250 h.p.	54,858	70,025
Ditto, parts	81,324	74,119
Converting machinery	12,611	5,106
Transformers, including coils	650,125	443,833
Rectifiers for power house use	67,056	20,584
Motor starting and controlling gear	203,711	216,098
Switchgear and switchboards (not telegraph or telephone)	1,076,683	769,357
Other electrical machinery	26,761	32,489
TOTAL electrical machinery	4,251,581	3,861,106
Vacuum cleaners and parts	93,338	128,672
Other electrically operated portable appliances	93,289	113,191
Portable electric tools	91,201	52,650
GRAND TOTAL	10,966,253	11,470,102

States increased from £29,860 to £30,291.

Thanks mainly to larger consignments to Australia (£213,836 compared with £65,316) and South Africa (£144,256 compared with £63,422), telegraph and telephone cables and wires exported rose from £536,070 to £737,660. In all other sections of the cable market there was a diminution in business traceable to a large extent to reduced buying by India (£162,943 compared with £483,931), South Africa (£81,085 compared with £257,813), Russia (nil compared with £60,613) and Argentina (£22,226 compared with £79,820). Under these classifications too both Australia and New Zealand bought more.

TABLE II.—DISTRIBUTION OF ELECTRICAL GOODS AND APPARATUS

Destination	January, 1950	January, 1949
	£	£
Channel Islands	43,489	30,621
Malta and Gozo	9,020	12,772
Cyprus	8,181	13,477
British West Africa ...	135,555	110,380
Union of South Africa ...	707,017	947,272
Northern Rhodesia ...	33,689	11,323
Southern Rhodesia ...	99,256	55,415
British East Africa ...	128,100	93,134
Bahrein, Koweit, Qata and Trucial Oman	43,450	46,077
India	521,879	1,080,550
Pakistan	64,487	109,554
Malaya	230,784	214,127
Ceylon	53,559	79,819
Hong Kong	144,292	103,123
Australia	1,007,243	711,973
New Zealand	402,022	298,015
Canada	51,571	52,820
British West Indies ...	69,858	132,913
Anglo-Egyptian Sudan ...	24,358	11,335
Other Commonwealth Countries	77,283	69,974
Irish Republic	214,957	282,770
Soviet Union	14,427	127,441
Finland	30,432	35,400
Sweden	154,824	112,871
Norway	138,272	208,047
Iceland	33,270	12,294
Denmark	71,545	88,092
Poland	23,902	32,283
Germany	23,658	10,023
Netherlands	185,751	192,989
Belgium	73,188	99,582
France	66,891	84,901
Switzerland	41,436	31,467
Portugal	58,145	141,963
Spain	15,655	271,144
Italy	20,025	18,588
Austria	55,330	11,271
Hungary	21,462	28,081
Czechoslovakia	28,909	17,472
Greece	53,119	75,836
Turkey	21,453	117,129
Indonesia*	54,414	36,595
Netherlands Antilles ...	4,865	8,110
Portuguese East Africa ...	12,417	24,376
Syria	44,049	110,404
Lebanon	42,197	73,970
Israel	18,596	22,925
Egypt	127,727	201,341
Arabia	8,326	19,038
Iraq	60,747	67,267
Iran	115,831	134,174
Burma	86,698	51,235
Thailand	14,952	15,590
China	4,980	20,232
United States of America...	30,291	29,860
Mexico	4,284	7,351
Colombia	2,748	10,041
Venezuela	47,200	73,065
Chile	39,208	36,238
Brazil	70,776	59,968
Uruguay	16,815	16,030
Argentine Republic ...	290,016	293,651
Other Foreign Countries	123,953	53,704
TOTAL	6,436,894	7,314,483

* Includes Netherlands New Guinea in 1949.

Doubling of commercial radio apparatus business, due principally to bigger demands from South Africa and "other foreign countries", was counterbalanced to some extent by a fall of about £100,000 in exports of domestic radio apparatus, India and South Africa being largely responsible in this case. Despite the fact that over £200,000 worth more went to Australia, telegraph and telephone apparatus exports declined from £1,333,108 to £1,256,287.

Australia and South Africa both contributed to a fall from £274,557 to £178,059 in the overseas business in cooking and heating appliances. Of £293,585 worth of electrical instruments India took only £17,045 compared with £91,442.

The brightest section of the electrical machinery market was that concerned with equipment other than generators and motors. Here the total business rose from £1,487,467 to £2,036,947, the biggest buyers being South Africa (£519,185) and India (£434,962). Generating plant was also in increasing demand with Russia taking £709,312 out of a total of £1,436,816. With the exception of railway and tramway units and parts, all types of motors showed reduced exports.

One other item, not included in our table, but nevertheless predominantly electrical, namely refrigeration machinery, shows an encouraging improvement from £570,293 to £779,439, of which Australia took £198,628 worth.

I.E.E. Scholarships

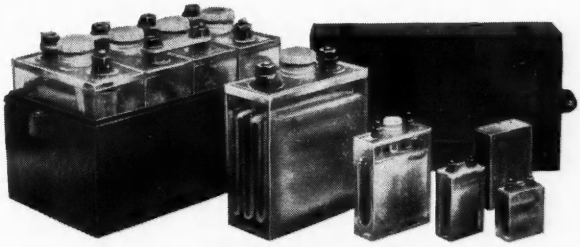
PARTICULARS will be found in our advertisement pages to-day of five research scholarships and grants and four scholarships for students to attend universities or technical colleges, offered by the Institution of Electrical Engineers. The closing date for applications for student scholarships is 15th April next, and for the research scholarships 1st June.

New Lightweight Accumulator

Unconventional André-Yardeny Type

By C. L. CHAPMAN*

Associate I.E.E., M.S.I.T.



Selection of silver-zinc accumulators compared in size with an ordinary match box

A DEVELOPMENT of outstanding interest to everyone concerned with the storage of electricity has been made possible by the researches of Professor Henri André, Paris, who has spent the past fifteen years in perfecting the André-Yardeny alkaline silver-zinc rechargeable accumulator which is one-third the weight, and about half the size, of the normal lead-acid battery of similar capacity.

Although before the last war Professor André had reached the stage of producing such an accumulator, its life was limited by the solubility of the zinc electrodes. Despite this handicap, however, some twenty-five thousand cells of this type were produced and used in France during the war. By the end of the war, André

* Chief Engineer, Venner Accumulators, Ltd.

Sketch of cell showing folded electrodes

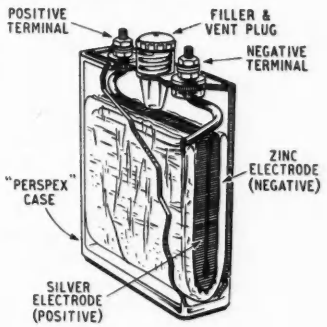


TABLE I.—BATTERY SPECIFICATION

Type		C	D	M	BRB	BRB6
Capacity		0.5 Ah	1.0 Ah	5 Ah	40 Ah	40 Ah
Voltage		1.5 V	1.5 V	1.5 V	1.5 V	6 V
Weight		0.624 oz	0.96 oz	3.75 oz	1.5 lb	7.25 lb
Volume		0.69 cu in	1.36 cu in	4.04 cu in	18.5 cu in	140 cu in
Dimensions	Width	1.125in	1.125in	.806in	4in	4in
	Length	.5625in	.625in	2.056in	2in	7in
	Height	1.5in	1.9375in	2.9in	5in	5in
Energy 10 hr. rate		0.75 Wh	1.5 Wh	7.5 Wh	60 Wh	240 Wh
Mass/Energy		19.2 Wh/lb	25 Wh/lb	32 Wh/lb	40 Wh/lb	33 Wh/lb
Volume/Energy		1.8 kWh/cu ft	1.9 kWh/cu ft	3.2 kWh/cu ft	5.6 kWh/cu ft	3 kWh/cu ft
Life. No. of cycles		250	300	400	500	500
Total useful energy		0.19 kWh	0.45 kWh	3.0 kWh	30 kWh	120 kWh

had perfected a rechargeable silver-zinc cell with insoluble electrodes, thus satisfactorily concluding many years of research and development.

It is now being produced in this country by Venner Accumulators, Ltd., a subsidiary of Venner Time Switches, Ltd., which holds the sole manufacturing and selling rights for Great Britain and certain parts of the Commonwealth. The range at present in production, or to be available in the very near future, comprises 0.5, 1, 3, 5, 15, 20 and 40 Ah types.

The silver-zinc cell differs in many respects from the more conventional lead-acid and nickel-iron types. Apart from the actual materials employed, the main difference between the new accumulator and its contemporaries is the method of construction. For example, instead of the built-up plates or pasted grids of the lead-acid or nickel-iron batteries, the Venner accumulator incorporates specially prepared silver (positive) and zinc (negative) electrodes, both of which have wire "interwoven" into the sheet for transmitting current to the terminal pillars. The electrodes are wrapped in a semi-permeable material and form the basic assembly of each cell. Suitable combinations of the basic assembly, according to the capacity and characteristics desired, are then enclosed in an injection moulded plastic case and finally filled with electrolyte (a specially purified solution of caustic potash) ready for their first formation charge.

As the cells do not contain plates or separators and because the material used to cover both the positive and negative electrodes is of an absorbent nature, the bulk of the electrolyte is in an absorbed condition. Thus the cells are unspillable, while the usual risks of buckling of the plates and shedding of active materials cannot occur. An additional advantage is that, when charging, the cells emit only minute quantities of hydrogen, while on discharge the amount of oxygen given off is equally negligible; thus at no time does the cell emit injurious, poisonous, or corrosive vapours.

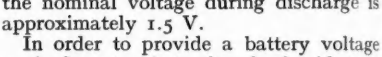
Maintenance is very similar to that of any other battery, involving only normal charging in the ordinary way and occasional topping up of the electrolyte with very small quantities of distilled water. It should be noted, however, that the addition of acid or electrolyte as specified for other types of accumulator will destroy the silver-zinc cell almost immediately.

Once the accumulator has passed through its formation process, the electrolyte, as such, does not undergo any chemical change during the subsequent charge-discharge cycle, this action being expressed by the equation:

$$Ag + Zn\ (OH) \underset{2\leftarrow}{\longrightarrow} Ag + Zn + HO_2$$

Thus, as in the case of the nickel-iron cell, there is not any noticeable change in the character or specific gravity of the electrolyte, the terminal voltage of the cell providing an indication of the state of charge. The cell is not injured by discharge to zero, or by short circuits and high rates of discharge. Characteristic charge and discharge curves show that the nominal voltage during discharge is approximately 1.5 V.

In order to provide a battery voltage equivalent to that of a lead-acid type accumulator, it is necessary to assemble cells in the ratio of four silver-zinc to three lead-acid. Despite this arangement, however, the standard types of silver-zinc accumulator are still only half the size and one-third the weight of their lead-acid



Charge characteristics of normal cells

Discharge characteristics of rechargeable Venner alkaline cells at three different rates

equivalents. For certain special applications, even greater advantages can be obtained, while 40 Wh/lb weight is a standard production achievement.

It is difficult to think of any purpose for which accumulators are used in which their weight and size are not the predominant factors. When it is realized that a 1 Ah silver-zinc cell measures only 1⅛ by ⅝ by 15/16in and weighs no more than 1 oz, it becomes immediately apparent that the possible applications for such a small lightweight battery are practically unlimited. There is enormous scope, for instance, in hearing aids, model engineering, and remotely-controlled weapons. Similarly, they should be of use in miners' hand lamps and be of service in aircraft where weight and volume are of paramount importance.

The previously quoted figure of 40 Wh/lb can be a very favourable basis for the production of electric vehicles of higher speeds and greater ranges of operation than those customary at present. The saving in weight and size would also allow of considerable increases in the pay-loads carried by such vehicles.

Further development, which is well advanced, is necessary before large-capacity traction batteries will be generally available.

Dutch Power for Switzerland

WE learn from a correspondent in the Netherlands "that arrangements have been made between Dutch and Swiss electricity authorities for the supply of power in bulk by the Netherlands to Switzerland during the night through the German 220 kV system and with German co-operation. The shortness of water power, due to drought, in Switzerland is of such a serious nature that the Swiss authorities consider it an economical proposition to import thermal-generated power from the Netherlands, in spite of the long distance, because it will save their water storage.

The Netherlands, in their turn, are suffering from a shortness of plant capacity—like Great Britain though not to the same extent—so that power export is only possible during the night.

The interconnection between the Dutch 150 kV grid and the German 220 kV system was recently completed by installing a 100,000 kVA group of single-phase transformers at Lutterade, in the extreme south of the Netherlands. Interconnection between Swiss and German systems existed already at the Rhine power station Ryburg-Schoröstadt.

If conditions in Switzerland continue to be as they are now, it is expected that some 25 million kWh will be exported during the winter months which, incidentally, will also help to improve the trade balance, which is rather unfavourable for the Netherlands.

Though exchange of power between adjacent countries existed already to some extent in Western Europe, this is the first exchange between two non-adjacent countries through a third country. It will in due course be followed by exchange of power between Norway and Denmark through Sweden of a reverse nature, i.e., from water-power sources to a country with only thermal power stations.

This form of international co-operation in the matter of electricity supply is welcomed both from a political and from a technical point of view.

Engineering Congress

THE third International Mechanical Engineering Congress will be held in Brussels from 18th to 23rd September next, when the theme will be "Quality." At a recent meeting of the Organizing Committee, the U.K. was represented by Mr. A. W. Berry, director of the British Engineers' Association, and the number of national trade associations constituting this Committee was increased by the inclusion of Signor Rappini representing the Italian organization of engineering manufacturers. The Committee decided to reduce the number of papers which have been read at previous Congresses and arrange for visits to be made to certain works in the neighbourhoods of Brussels and Antwerp during the week. The detailed programme listing the titles of papers with names of those presenting them and full information, with application forms, will be available at a later date from the British Engineers' Association, 32, Victoria Street, London, S.W.1.

Commerce and Industry

Revision of N.J.B. Agreement
Dudley Wiring Contracts

THE National Joint Board for the Electricity Supply Industry has completed its task of revising the current agreement covering the salaries and conditions of employment of the technical engineering staff of the Electricity Boards, and at its meeting on 17th February approved a final draft of the revised agreement. The scope of the agreement has been extended to include not only the power station and distribution staffs, but also those of the Central Authority headquarters, Area Board headquarters and Divisional headquarters, many of whom were previously embraced within the organization of the former Central Electricity Board. The revised agreement takes effect from 1st July, 1949.

Lighting in a Pipe Works

The pipe works of Horseley Bridge & Thomas Piggott, Ltd., Tipton, Staffs, have recently been re-equipped throughout with a new lighting system using "Osram" 400 W high-power mercury-vapour lamps. Among the activities of the works is the manufacture of large diameter steel pipes from sheets, and the good general illumination provided by the scheme has enabled the forming and welding of pipes, and the internal coating with bitumen of those to be used as water mains, to be carried out rapidly without local lighting being required.

The three bays of the building are 60ft long, and are equipped with a total of 150 lamps in G.E.C. deep dispersive reflectors. Two of the bays are 70ft wide, and in these the fittings are mounted at a height of 37ft 6in. The width of the third bay is approximately 26ft. The control gear is installed in groups consisting of one power factor correction capacitor and two chokes for each pair of lamps. Measurements taken after the installation had been in service for several weeks showed an average illumination of 7 to 8 lumens per sq ft.

"Osram" h.p.m.v. lamps installed in the pipe works of Horseley Bridge & Thomas Piggott, Ltd., Tipton

Future Radio Exhibitions

It has already been announced that the next National Radio Exhibition is to be held at Castle Bromwich, Birmingham, from 6th to 16th September next. Subsequent shows are to be held at Earls Court, London, in September 1951, 1952 and 1953.

The Radio Industry Council, in announcing this, says that an earlier decision to hold the exhibition at Olympia, London, in June instead of in the autumn had been changed, but this change came too late to secure convenient autumn dates and the necessary space at Olympia. In view of the facilities offered at Earls Court, it was decided to go there rather than hold the exhibition at Olympia at a less convenient time.

Wiring Contracts

In connection with the Dudley Corporation's scheme for the provision of electricity to 1,500 council houses, a letter has been received from the National Register of Electrical Installation Contractors pointing out that the scheme makes no mention of registered contractors being permitted to tender for this work and asking that they should be allowed to tender.

A Stechford firm of

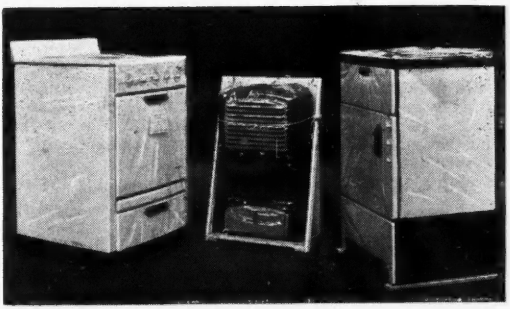
electrical contractors has also protested against the Council's intention to restrict the work and to only allow tenders from the Midlands Electricity Board and members of the Electrical Contractors' Association. The firm stated that it holds approximately 150 to 200 signed contracts to install electric lighting in certain Council houses and is retaining the initial payments made by the tenants concerned. It has requested the Council to allow it to carry out the work.

The Corporation Housing Committee has approved resolutions providing that the borough architect should prepare the necessary specification and that tenders be invited for carrying out the work in sections; that the town clerk should ask the secretary of the N.R.E.I.C. for a list of contractors in Dudley and district who are included in the National Register; that (subject to further consideration being given to registered contractors at a later date) the Council adheres to the previous decision that only tenders from the Midlands Electricity Board and members of the E.C.A. shall be considered for this work; and that a letter be sent to the Stechford firm strongly disapproving its intention to hold the deposits and pointing out it had no right to enter into contracts with tenants without obtaining the consent of the Corporation as landlord.

Wrapping Cookers in "Cellophane"

Following comprehensive tests, Parnall (Yate), Ltd., is now wrapping its entire output of electric cookers in "Cellophane" cellulose film. Previously the apparatus was packaged in brown paper, corrugated and kraft paper secured with string and adhesive tape. The company finds that the new method has several advantages over the old, one of the most important being the reduction of labour costs by as much as 50 per cent with no increase in the cost of wrapping materials. The change-over to film also pleased the Despatch Department, for it is now possible to identify apparatus and check its condition without breaking open the pack.

A point of particular interest revealed by tests is that carters and loaders handle the appliances far more carefully when they can see what they are handling. Previously the enamel finish was often damaged by rough treatment in transit because the old pack looked strong and solid. This damage has now been greatly reduced. Another point is that the brown paper formerly used in packing caused a stain on the enamel that was hard to remove; with a "Cellophane" film wrapping this no longer occurs.



Parnall cookers wrapped in "Cellophane"

Customers welcome the innovation as they now receive their consignments wrapped in attractive, dust and moistureproof covers ready for immediate display in the showroom. Furthermore, they are able to check the condition and type of cooker as soon as it arrives so that damage or deficiency can be reported without delay.

Wage Claim Postponed

At a meeting in York last week the executive council of the Confederation of Shipbuilding and Engineering Unions postponed until 9th March its decision upon further action following upon the employers' rejection of its wage claim. One reason given was the desirability of having the views of the member unions, particularly the Amalgamated Engineering Union which was holding a meeting to consider the question on 2nd March.

Kent Contractors' Dinner

The first annual dinner of the East Kent Branch of the Electrical Contractors' Association for eleven years was held at Canterbury on 16th February. Mr. A. Apps (chairman of the branch) presided, supported by Mr. P. G. Wallis (vice-president of the Association). Speaking of the branch Mr. H. T. Laslett said that while there had been a slight falling off in membership since the last dinner, the quality was better than it had ever been.

Mr. M. R. Neville (General Electric Co.) proposing "The Association," commended the E.C.A. apprenticeship scheme and suggested that employers should supplement technical training with talks and discussions on the social duties of their craft. Mr. Wallis

said that there were 59 representatives of manufacturers and wholesalers present and he asked them if the "bits and pieces" used by the industry could not be standardized.

Mr. J. Dennis Pooley (Pooley and Hunt) stressed the importance of co-operation between the nationalized side of the industry and that run by private enterprise, and suggested that the latter should do their best to improve their methods of salesmanship.

The "Blue Book"

The 68th edition of the *Electrician* "Blue Book" (Electrical Trades Directory, 1950), which is now available, has been considerably enlarged (1004 pages). The general arrangement has been altered to facilitate reference to the various sections of the electrical industry, with considerably more detail. The contents are more widely sectionalized under specific headings, and the alphabetical section has been divided into eleven distinctive sections, reference to any concern or person being simplified by an alphabetical guide. The classified section has also been expanded with further headings and sub-divisions, while considerable additions have been made to the trade names section. The directory is published by Benn Brothers, Ltd., Bouverie House, 154, Fleet Street, London, E.C.4, at £2 2s, including postage.

Television in South Africa

At the Rand Agricultural Show, which will be held in Johannesburg from 1st-10th April, television demonstrations are to be given by Marconi's Wireless Telegraph Co., Ltd., and Cinema Television, Ltd.

Cookers for Export

The accompanying picture shows a fleet of lorries leaving the Enfield works of Belling & Co., Ltd., loaded with electric cookers for export to Australia and the Far East. In three years this company's sales overseas have increased by 500 per cent. This success is claimed to be due to thorough research on the spot by members of the staff before opening up in any market, and sound marketing and servicing arrangements. At the present moment advance publicity is taking place in the United States and Canada for several special appliances—among them an attractive log fire.

A consignment of Belling cookers leaving the company's Enfield works for Australia and the Far East

Plastics Exhibition

A British Plastics Exhibition and Convention are to be held at Olympia, London, early in June, 1951. Exact dates are to be announced later. The exhibition, which will be the first trade exhibition representing the whole industry, will be open to all British firms who produce, mould and fabricate plastics materials or supply raw material or equipment to the plastics industry. While primarily for the trade, it will be open also to the public. At the convention lectures, discussions and films will cover all aspects of materials, production and applications. The exhibition and convention are being organized, with the full approval and co-operation of the British Plastics Federation, by *British Plastics*, one of the journals published by Associated Iliffe Press.

Electrodepositors' Conference

The silver jubilee conference of the Electrodepositors' Technical Society will be held from 19th to 22nd April next at the Grand Hotel, Eastbourne. In addition to five technical sessions a number of social activities have been arranged including the annual conference dinner, coach tours, concerts, a sea trip and a special programme for ladies. Particulars can be obtained from the conference secretary, 27, Islington High Street, London, N.1, and applications to attend should be made by 25th March.

T.M.C. Technical Journal

A new and attractively produced house organ has made its appearance. It is intended periodically to record the technical developments of the Telephone Manufacturing Co., Ltd., by means of original monographs under the names of the engineers to whom the particular work described may be principally ascribed. By way of preface,

Vol. I, No. 1, of the "T.M.C. Technical Journal" gives an impression of the resources of the organization, which was founded nearly forty years ago, followed by illustrated descriptions of a newly introduced magneto-generator, selector telephones and specialized activities of the company's Transmission Division.

Contractor's Claim

At Clerkenwell County Court on 13th February Mr. C. E. Hart, electrical contractor, sued Phillips & Thornton, Ltd., Conduit Street, W.1, for £7 16s 6d for work done and materials supplied in installing a motor to work a bank of sewing machines, and he produced figures showing that the cost of labour and materials was £5 3s 6d. Mr. W. T. Tacey, a director of the defendant firm, said that they objected to paying more than a reasonable sum, and that in point of fact a verbal estimate to do the job for £4 had been given by Mr. Hart. Mr. Hart denied this.

Mr. Registrar Friend asked for detailed figures and commented that the final account included 50 per cent profit. Mr. Hart said that that was the normal profit for accounts under £10. Over that figure it would be reduced to 33⅓ per cent.

Mr. Friend said that the account would be reduced to £6 and there would be judgment for Mr. Hart for this amount, with costs.

"Handle with Care"

The usual labels on packages requesting that they be handled with care do not always have the desired effect. To draw special attention to packages containing fragile goods, the Benjamin Electric has designed two special labels which will be affixed to all their packages and wooden cases for home and export. These have humorous drawings with suitable wording asking that care should be exercised, which should prove far more effective than the stereotyped label.

Transformers for Holland

A "nought" was dropped in last week's reference to the large Metropolitan-Vickers transformers for Lutterade, Holland. The voltage ratio is 220/150/10.5 kV.

Export Lectures

The Institute of Export announces a new series of twenty lunch-time lectures on various aspects of export trade, to be held weekly at Conway Hall, Red Lion Square, London, W.C.2, between 7th March and 1st August. Five lecturers have consented to participate and the subjects to be dealt with will be selling overseas, shipping the goods, financing export, exchange and trade control and legal aspects of overseas trade. Admission will be by ticket only obtainable at an inclusive fee (for the full course of twenty lectures) of 10s 6d to members of the Institute (including student members and registered students) or £1 1s to non-members. Applications for course tickets should be made to Mr. A. J. Townsend, general secretary of the Institute, 140, Cromwell Road, London, S.W.7.

Wire Drawing Achievement

A notable achievement in the drawing of fine tungsten wire was recently made in the wire-drawing section of the Osram Lamp Works of the General Electric Co., Ltd., when a length of 33 miles of 0.015mm diameter wire was drawn without a break. The wire started as in ingot of sintered tungsten 10in long and was passed through 57 tungsten carbide and diamond dies before being reduced to its final diameter. The drawing time was 100 hours and during this time the metal traversed a distance of 250 miles. At its final thickness, about ⅛ of that of a human hair, it will be used in the manufacture of electric lamp filaments.

Lighting Fittings Showroom

In our notes on the new London showroom of the Philament Electric, Ltd., in our issue of 10th February, we stated that the company's sales manager was Mr. B. Cadman. This should have read Mr. E. B. Cadman.

Ega Developments, Ltd.

This company, whose registration was recorded in our last issue, asks us to make it clear that its main purpose is to market and distribute the "Egaspray" electric airless spray which will be made by the Ega Electric, Ltd., and not to act as wholesalers or retailers.

Trade Announcements

A northern branch office has been opened by **Dewhurst & Partner, Ltd.,** at 36, Red Hall Drive, Newcastle-on-Tyne, 7 (telephone: Benton 62172). The new office is under the control of Mr. E. Ford, the company's resident engineer and manager.

W. T. French & Son, Ltd., Birmingham, announce that following the closing of their London office, they now have a mobile showroom continuously touring the London area. This showroom is under the direction of Mr. A. E. Mora, 112, Great Russell Street, London, W.C.1 (telephone: Museum 8954), the company's London sales supervisor.

Best Products, Ltd., Felixstowe, are erect-

ing an additional factory adjacent to its existing works, which will be devoted to electro-plating and metal finishing services. The existing works are being extended, absorbing the area to be vacated by the present plating shop. Another floor is also being added. The new space will be devoted to domestic electrical appliance production.

Insulating Tape for High Temperatures

The name of the manufacturers of the polytetrafluoroethylene insulating tape described in last week's issue (page 294) was incorrectly given. It should have been Crane Packing, Ltd., Slough.

Ex-J. & P. Association

The annual dinner and reunion of the ex-Johnson & Phillips Association will be held on 4th March at Grosvenor House, London, W. Tickets (£1 1s each) can be obtained from Mr. H. D. Parsons, hon. secretary, "Heigham," 20, Beaumont Road, Orpington, Kent.

Birmingham Electric Club

The report for 1949 of the Birmingham Electric Club shows that fifty-one applications for membership were approved during the year, bringing the total to 620. The report and accounts will be submitted to the annual meeting to be held on 20th March at the Grand Hotel, Birmingham.

Redesigned Kettle

The new 1,500 W "Pylon" kettle brought out by Premier Electric Heaters, Ltd., and described on page 295 of last week's issue is, at 62s, 6s cheaper than its predecessor, not 1s as stated.

Electric Traction Film

The British Thomson-Houston Co., Ltd., has produced the third part of a documentary film dealing with its electric traction activities. The first and second parts were respectively concerned with battery-operated vehicles and trolley-buses; the third deals with electric trains of the multiple unit type. The new film begins by outlining the advantages of electric railway traction generally and passes on to a brief historical review of its use in London, indicating the growth of the Underground system from its earliest days. The multiple-unit electric train and its equipment are then described in some detail, and a particularly well thought out animated circuit diagram illustrates the mode of operation of the traction motor control gear. The film concludes by showing a wide variety of multiple-unit trains, the traction equipment for which the company has supplied to organizations all over the world.

Institute of Engineering Inspection

At an extraordinary general meeting of the Institute of Engineering Inspection, held in December, a new class of membership, "Associate" was created under the following description:—

"Associates to be persons over twenty-three years of age who are or have been engaged on engineering inspection but who are not at present eligible for election to any other classes of membership but have had an engineering apprenticeship or pupilage or sufficient engineering or allied experience."

"*Electrical Review*" Index

Copies of the index to Volume CXLV of the *Electrical Review* (July-December, 1949) are now available and can be obtained from the Publisher, *Electrical Review*, Dorset House, Stamford Street, London, S.E.1.

Catalogues and Lists

Brook Motors, Ltd., Empress Works, Huddersfield.—Two leaflets. Nos. 660 and 662 on contactor type automatic motor starters.

Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4. —Technical brochure (4001) on air-washing equipment, and folder 4002 on a viscous type air filter.

T. B. Morley & Co., Ltd., Jameson Street, Hull.—Leaflet on the "TeBeaM" remote control unit for appliances rated up to 20 A a.c.

Steatite & Porcelain Products, Ltd., Stourport-on-Severn, Worcs. — Catalogue (No. 34) describing a range of pin-type insulators for overhead transmission lines.

Marshall Electrical Co., Ltd., Tottenham Mews, Tottenham Street, London, W.1.—Folder giving net trade prices of electrical accessories.

Everett, Edgcumbe & Co., Ltd., Colindale Works, London, N.W.9.—Technical folder on electrically operated speed indicating and recording instruments.

Beta Manufacturing Co., Poplar Works, Valley Road, Shipley, Yorks.—Catalogue and trade price list of domestic and commercial lighting fittings and a folder describing "Monocap" fittings for lipless spheres.

Manchester Oil Refinery (Sales), Ltd., 2, Mosley Street, Manchester, 2.—Technical brochure dealing with anti-corrosive compounds for the protection of all types of specialized equipment.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publications Responsibility cannot be accepted for the opinions expressed by correspondent

Load Flow Calculations

MR. G. W. MAXFIELD, in your issue of 17th February, questions the originality of Mr. McPherson's article on the subject above. Mr. Maxfield may well be right; it is quite common for methods which have lost their popularity to be rediscovered. However, most of his letter is devoted to denigrating the reputation of network analysers and it calls for comment on that score.

It is quite true that modern methods of network solution have greatly improved the reliability of the results of arithmetical methods and minimized the labour. Nevertheless, if full solutions are required of the power flow on power systems, including the voltage and reactive power distribution and the effect of such things as transformer taps and condensers, then the arithmetic is beyond hand calculation. Some form of automatic computing engine must be employed to do this work, and the cost and complication of such equipment for equal facility is likely to be of the same order as that of a network analyser.

It is not clear what Mr. Maxfield means by "supply" networks, nor what sort of solutions he has in mind. I suspect that the networks were distribution systems with one point of supply and that watt flows only were determined. Presumably, also, the solutions achieved by the young lady who "didn't know the first thing about it" were correct arithmetically irrespective of the validity of the assumptions on which they were based. Solutions of active power-flow distribution systems are those readily handled on the d.c./resistance type of analyser, and it is a matter of convenience and opinion whether the analyser or the calculation should be employed. Incidentally, analysers of this type can be built quite cheaply.

For full solutions of interconnected networks, the a.c. network analyser offers the only practical method at the present time. In the U.S.A. there are twenty such analysers, used 60 per cent of the time for load studies, the system planning and operating engineers regarding their use as much as a routine matter as the use of a slide-rule. A point which is not appreciated by those without experience of the a.c. network analyser is the freedom one has to study the behaviour of the system rather than of one's arithmetic. The way a system "handles" on the analyser is often highly significant and operating information is obtained which would never emerge from pages of calculations.

The "recent talk regarding the necessity for network analysers" is not an over-statement, but very much overdue in this country. Too many millions of pounds have been spent on system development in the past on the basis of shirt-cuff calculations, with, as one would expect, somewhat uneven results in practice.

G. LYON.

*Harlesden, N.W.*10.

Overhead Line Planning Permissions

IN your issue of 27th January the Public Relations Officer of the B.E.A. lists certain safeguards which exist in connection with taking an overhead line through fine landscape: thus "the Electricity Board concerned must . . . obtain planning permission under the Planning Act, 1947."

On this matter there is considerable doubt among members of planning committees themselves and among others interested. It is far from clear whether the Board accepts a direct "Yes" or "No" in this matter from the planning authority, the Minister of Fuel and Power not having any connection at all with this "planning" permission; or whether, on the other hand, the Minister is operating Section 35 of the Planning

Act which he is able to do, but need not do) and is himself giving the planning permission.

If the Minister is using Section 35, and is thus operating what is known as the "deemed planning procedure," then the standard of countryside preservation, in this respect, is unified. In the other event it will vary with the varying demands and judgment of the different Boards, and with the varying judgment of the planning authorities to whom they make application. Will Mr. Luffingham tell us whether the Minister is, or is not, operating the "deemed planning procedure" of Section 35 of the new Planning Act?

The other "consents," to which he referred, where the local authority has an opportunity from the Minister of "being heard," are not relevant to the safeguarding of landscape: these "consents" are concerned not with planning, but with safety, and date from long before the Planning Act, when any overhead line was still regarded as a risky thing, exceptional and suspect. The "consents" and the "planning permission" are entirely distinct.

(The Rev.) H. H. SYMONDS,
Chairman,
Friends of the Lake District.
Ulverston, Lancs.

Competitive Publicity

IN your issue of 17th February "Reflector" refers to the advertising by the North Thames Gas Board in theatre programmes and you commend to the London Electricity Board this enterprise which is of doubtful value. In doing so you raise the whole question of promotional publicity at the present time.

Since Vesting Day several Electricity Boards have been in a difficult position because not only have they been faced with the national shortage of generating plant but also with overloaded distribution systems in parts of their areas. This has been a legacy of the war period when extension work was virtually at a standstill, and of the immediate post-war period when there was an acute shortage of certain plant and materials.

For some time after Vesting Day, in spite of "Keep Off the Peak" advertisements, the Clow differential and other forms of restriction, the rate of increase of the electrical load was greater than the rate at which new generating plant was being brought into commission. This fact, coupled with the need to comply with the Government's economic policy, resulted in a considerable slowing down of all promotional publicity in our industry. Even the limited publicity carried out led to protests from some people who were unable to obtain supplies or who suffered from electricity cuts.

For the reasons stated above my Board has deliberately refrained from promotional publicity and has been somewhat surprised at the advertising activity of the Gas Boards because the gas industry is in no better a position than we are to take on unlimited loads. In the face of recent gas publicity, however, my Board is reconsidering the whole problem because it is not prepared to allow consumers to be lured from them by intensive advertising to which no adequate reply is made.

Many people in our industry will be glad to see a return of the strong competition between gas and electricity which was a feature of pre-war days and which always gives a pleasant kick to those who are on the commercial side. It is doubtful, however, whether the best interests of the community are served by endless competition at the present time.

I need hardly assure you that my Board and its entire staff are looking forward to the time when unlimited supplies of electricity will be available and when we can engage with our friends in the gas industry in that rivalry which, in days gone by, led to such prosperity for the electricity industry and to so many improved amenities for the public at large.

FRANK C. FENTON,
Chief Commercial Officer,
London Electricity Board.
London, E.C.2.

Jobs and Homes

IN the *Electrical Review* of 3rd February there appeared a letter signed "Fair Play" on the subject of "Jobs and Homes." I think the writer of that letter was wrong in assuming that residence in a specified area was called for because the applicant would be required for stand-by duties. My experience is that when a position is advertised, even though the location of the place of employment is

mentioned, applications are received from all parts of Britain and obviously it is impracticable for a man to travel daily between Dundee and London and the applicant often has no plans for moving to the neighbourhood of the employment. Hence, when advertising a situation, my employers specify that the applicant must live or have prospects of living within a reasonable travelling distance of the place of employment.

"Fair Play" states that "Many engineers accept appointments in strange districts where they are entirely unaware of the housing position, only to find that their chances of renting a house are nil."

I think that engineers who do this sort of thing must be singularly optimistic or ignorant of nation-wide conditions and if there are any parts of England where houses can be rented easily and cheaply, I shall be glad to hear of them.

PLANT ENGINEER.

Electrical Commercial Travellers

THIS year the Electrical Trades Commercial Travellers' Association celebrates its silver jubilee year, and there was an attendance of over 500 at the annual luncheon held at the Connaught Rooms, London, on Friday last.

The principal guest was Sir Henry Self, deputy chairman, British Electricity Authority, who, in proposing the toast of the Association, suggested that as this was the silver jubilee year of the Association it should adopt as its patron saint Benjamin Franklin. He drew an analogy between Franklin's experiment of extracting electricity from the atmosphere by means of a kite and the set-up of the electricity supply industry, in which he saw the guiding hand, the B.E.A. The commercial traveller was the man who turned the key which enabled the fullest use to be made of the electricity available.

Mr. N. V. Everton, president of the Association, in responding, suggested that to celebrate their jubilee they should endeavour to increase the membership from 670 to 1,000 by the end of the year. The toast of the guests was proposed by Mr. F. R. Robbins and Mr. T. F. Clarke responded.

Mr. W. Herbert, past-chairman of the Association, proposed the toast of the chairman, and Mr. C. L. Elvy, in responding, referred to the formation of the Association in 1924 and paid tributes to Mr. A. S. Markes, its founder, and to Mr. C. W. Sully, its first president.

Mr. S. Johnson, the charity steward was unable to attend owing to indisposition and Mr. Elvy, in making the appeal for the Association's charities, emphasized that as Mr. L. Gamage had been president of appeal for the Royal Commercial Travellers' Schools during the past year, the Association felt that a special effort should be made, and they had contributed over £1,100 to this appeal. A collection for the Association's charities during the lunch realized £104.

Windmill Sub-station

THE windmill on the foreshore at Lytham, Lancs, is one of the most picturesque electricity sub-stations in the country. Though there is doubt as to its exact age it is claimed that its career began in 1337. It has, of course, been restored from time to time and was rebuilt in 1760. Its active days were ended by fire in 1918 when it was the oldest working windmill in the Fylde. It was eventually taken over in 1938 by Lytham St. Annes Corporation which has recently restored it at a cost of £1,290. It is at present owned by the Corporation and tenanted by the North Western Electricity Board.

The windmill sub-station at Lytham, Lancs

Canadian Water Power

Progress during 1949

IN a review of hydro-electric progress in Canada in 1949, the Hon. Colin Gibson, Minister of Mines and Resources, Ottawa, states that the post-war boom in hydro-electric construction continued without abatement. Although no new large plants were brought into operation, an appreciable increase in installed capacity accrued from additional units coming into operation in existing stations, principally in those which were partially completed last year.

With the addition of 272,050 h.p. located in the new province of Newfoundland the installed capacity in Canada now totals 11,622,668 h.p. The increase during the year of 479,900 h.p. is slightly greater than that of 1948 and is well in excess of the pre-war yearly rate of expansion of about 300,000 h.p. A number of large developments in a state of advanced construction will add about 1,500,000 h.p. within the next two years, while other developments are being constructed or are contemplated.

In the field of power distribution, construction similarly was very active. New main transmission lines were completed or were under construction in most sections of the country. Many new transformer stations and sub-stations were built and secondary lines were extended. Rural electrification was particularly active in Quebec, Ontario and Manitoba.

The demand for hydro-electric energy continued to expand throughout the country as a result of a high level of industrial activity in conjunction with increased commercial, domestic and rural consumption. The increased over-all demand is reflected in the consumption of primary power which, according to the records of the Dominion Bureau of Statistics for the first ten months of 1949, increased 3.1 per cent over that for the same period of 1948 and 12.9 per cent over 1947.

Despite the additions to generating capacity, total production of central electric stations in 1949 was only 2.8 per cent greater than that of 1947. Generally speaking, stream flow conditions were unfavourable for a considerable part of the year and, at times, some of the large hydro-electric systems had difficulty in meeting all power demands. The completion of a number of the larger plants which are now under construction will be necessary before essential reserve capacity becomes available.

AUSTRALIAN NEWS

From a Correspondent

THE State Electricity Commission of Victoria plans to make the Greater Yallourn power station the largest in Australia. It will build what will, in effect, be two complete unit power stations, each of 100,000 kW capacity, as extensions to the existing station. The cost of this work will be approximately £20 million.

These extensions will enable Yallourn—which is already the source of about 60 per cent of the State's electricity—to generate 2,500 million kWh annually (double the present output). By 1956 it is expected that the station will have a capacity of 331,000 kW. In addition, four of the station's original generators, which will then be 32 years old, will be retained for emergency operation. These will be kept in running order until they are eventually replaced by modern plant. After 1956 a third extension is projected and eventually the station may have a capacity of 500,000 kW.

At the present time Australia's largest power station is Bunnerong, in Sydney, with a capacity of 325,000 kW, but there, as in most large Australian cities, much of the plant is outdated and there are frequent break-downs.

The new Victorian State Electricity Commission loan for the Kiewa-Morwell electricity expansion scheme carries an interest rate of £3 5s per cent, higher than that offered for the Commission's two previous loans. It is repayable in 15 years. Cash will be used to finance work on this new hydro-electric project, to make large extensions to the Yallourn power station, and to extend the Morwell brown coal briquette project. Present capital of the Commission exceeds £47 million, and last year's revenue was nearly £9 million.

At a recent meeting of the Sydney County Council it was decided to resist the New South Wales Government's proposal to set up a State Electricity Commission, and Cr. J. O. Cramer, one of the principal opponents of the move, said that its establishment would be "a highly political, socialistic and dangerous scheme." Other speakers said that the Commission would encroach on and weaken the prestige of local government and prejudice the Council's financial strength.

ELECTRICITY SUPPLY

Output 11 Per Cent Higher in January
620,000 kW of Plant Sanctioned

A RECORD total of 5,275 million kWh was generated in January at stations controlled by the British Electricity Authority, the North of Scotland Hydro-Electric Board and the Lochaber Power Co. This was 11 per cent more than in the corresponding month of 1949, the rate of increase comparing with an average of 7.3 per cent last year. After the net addition of 308 MW of generating capacity in December, making the total 13,913 MW, there was little change last month.

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ...	3,019	5.4	5,087	54	5,158	4,872	13,588
North of Scotland	21	1.3	30	82	117	116	326
Total for January, 1950	3,040	6.7	5,117	136	5,275	4,988	13,914
Total for January, 1949	2,819	5.0	4,595	139	4,757	4,494	13,239
Increase or decrease, per cent ...	+ 7.8	+ 34.0	+ 11.3	− 2.2	+ 10.9	+ 11.0	+ 5.1

* The total figure includes generation by oil engines, refuse destructors and waste heat plants amounting to 12 million, 0.3 million and 9.8 million kWh, respectively, in January, 1950.

New B.E.A. Colliers

By the names which the British Electricity Authority has chosen for additions to its collier fleet, a tribute is paid to three leading members of the electricity supply industry. Of three 4,600-ton colliers which are being built by William Pickersgill & Sons, Ltd., for trading to power stations on the Lower Thames, one is to be named after the late Sir Archibald Page and the other two will bear the names respectively of Captain J. M. Donaldson and Mr. W. J. H. Wood.

The new motor collier *Dame Caroline Haslett*, built by Hall, Russell & Co., Ltd., for the B.E.A. (London Division) has completed successful trials and been handed over to her owners. The vessel has been constructed under the supervision of Mr. N. W. Dawson, chief superintendent engineer of Stephenson Clarke, Ltd.

Ahead of Schedule

A letter of appreciation for their valuable contribution towards the national effort in enabling new power plant at the West Ham "B" generating station to be completed in advance of programme has been received by Taylor Woodrow Construction, Ltd., from Mr. J. N. Waite, controller, B.E.A. London Division. The power station is being built in three stages, each comprising two 30,000 kW sets. The first of these was scheduled for operation in March of this year, but trials were held in mid-December and it was in full operation in early January.

Change-over at Alnwick

The Urban District Council is to change over the street lighting from gas to electricity at Alnwick.

Generating Plant Extensions

During the past three months the British Electricity Authority has received the consent of the Minister of Fuel and Power to proposed extensions to eight power stations. The extensions provide for an aggregate installed capacity of 621,500 kW; the details are as follows:—

Station	Generating sets (kW)	Boilers (lb/hr)
Brimsdown, nr. Enfield	1—60,000	2—360,000
Carmarthen Bay, South Wales	2—60,000	4—240,000
Chadderton, Oldham, Lancs	1—60,000	2—360,000
Clarence Dock, Liverpool	1—51,500	2—350,000
Littlebrook "C," Kent	1—60,000	2—360,000
Staythorpe, Derbyshire	1—60,000	2—240,000
Tilbury	3—60,000	3—540,000
Woolwich	1—30,000	2—180,000

Carmarthen Bay, Chadderton, Littlebrook "C," Tilbury and Staythorpe are new

stations which have not yet been put in commission, although Staythorpe is expected to begin production within the next few weeks.

Southport Estate Supplies

Southport Corporation has received intimation from the Merseyside and North Wales Electricity Board that owing to the existing conditions and the restrictions on capital expenditure the Board is unable for the time being to proceed with the provision of a supply of electricity to 220 houses on the Central Avenue and Guildford Road housing estates. An approach is to be made to the Minister of Health urging that the Board should be pressed to provide the necessary supply without delay.

S.W. Scotland Council

A meeting of S.W. Scotland Electricity Consultative Council was held in Kilmarnock on 9th February, when the chairman, Councillor A. B. Mackay, reported on the work of the local representatives. The importance of the work of these representatives was stressed and suggestions were received for increasing their number. The Council noted with approval the reinforcement scheme in South Ayrshire at a cost of £1,200,000, and also the reinforcement schemes for Millerston, Kirkintilloch, Coatbridge and Airdrie, which had been reviewed under the Government's capital expenditure programme and were regarded as essential projects.

Diesel Plant for Gairloch

A new diesel generating station inaugurated by the North of Scotland Hydro-Electric Board on 10th February at Aultbea (Wester Ross) will serve the Gairloch area until the opening of the 600 kW hydro-electric station now being constructed. Gairloch parish is one of the most sparsely populated areas in Britain. Altogether, 83 miles of overhead distribution lines will be required to supply power to a total of 500 consumers. Initially a supply was given only to Gairloch but it is expected that the entire area will be served in little over twelve months.

House Wiring

Dudley Housing Committee reports the receipt of a letter from the Ministry of Health Regional Office stating that if the Council is satisfied that the necessary cable and mains equipment can be laid and the electricity supply authority can meet the extra demand for electricity, the Ministry will be prepared to consider an application for loan consent to meet the cost of wiring houses at present without a supply of electricity. In this connection the Committee has under consideration the installation of electricity in 1,500 Council houses.

Lighting of Sunderland Schools

A motion to refer back a £10,000 scheme for installing electricity in certain schools served by gas has been rejected by the Sunderland Town Council, and R. W. Gregory & Partners, Pilgrim Street, Newcastle, have been appointed consultants for the work.

Ebbw Vale Street Lighting

A fluorescent street lighting scheme covering the whole of the town centre of Ebbw Vale, was officially inaugurated on 25th January by Mr. F. Talbot, chairman of the Lighting Committee. The equipment comprises thirty-three G.E.C. "Four-Eighty" lanterns, each with four "Osram" 5ft 80 W fluorescent lamps, and steel standards of special design. It was stated at the switching-on ceremony that it is intended to extend the installation to the site of a new town development scheme.

This 100 kW diesel engine built by British Polar Engines, Ltd., at its new Govan factory is now producing electricity for Dunoon. The engine is one of ten ordered by the North of Scotland Hydro-Electric Board to increase the generating capacity in some isolated areas of the North of Scotland

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

India Rubber, Gutta Percha & Telegraph Works, Co., Ltd., reports a consolidated profit of £142,759 for the year ended 30th September last, as compared with £291,013 for the preceding year, to which is added other income of £2,845, and after providing for depreciation, taxation, etc., there is a net profit of £62,708 (against £130,817), plus net interest on settlement of war damage claim of £7,423. The net profit of the parent company is £45,683 (£63,699). Contingencies reserve receives £25,000, and it is proposed to maintain the dividend for the year on the preferred ordinary at 8 per cent, and on the ordinary at 9 per cent. The balance carried forward is £126,356 (against £124,786 brought in).

In his statement issued with the report and accounts, Sir Walrond Sinclair (chairman) says that the turnover during the year under review shows a marked decline from the record level reached in 1947-48. The bulk of the decline took place in the second half of the year when the sellers' market became a buyers' one, while costs of raw materials and labour rose, which in face of the shrinking turnover could not be passed on in the form of higher selling prices. Despite this their export sales have increased. Devaluation may assist their exports in certain directions, but the immediate effect has been to increase the cost of their main raw materials, and this has compelled them to revise the selling prices of several of their products.

Cable & Wireless (Holding), Ltd.—A revised reconstruction scheme was announced last week. This scheme, which has the support of the Ordinary Stockholders' Committee, gives holders of the ordinary stock the opportunity of retaining their interest in the company, which will continue as an investment trust, or of taking securities. The alternatives are: £125 nominal in 3 per cent savings bonds, 1965-75, plus £180 ordinary stock (resulting from a bonus distribution of £80 ordinary), or the right to take in lieu of the whole or any part of the £180 ordinary stock 3½ per cent unsecured loan stock.

Preference stockholders, in addition to the offer of repayment in cash at par or £65 in cash plus £40 (nominal) 3 per cent savings bonds for each £100 stock, are now offered two further alternatives, to convert their holdings in whole or in part into ordinary stock at par, or receive in whole or in part 4 per cent 10-year unsecured loan stock.

R. A. Lister & Co., Ltd.—Speaking at the annual meeting on 20th February, Sir Percy Lister (chairman) said that during the year they had spent £420,000 on buildings, plant and machinery in connection with their programme of replacement and expansion at their various factories at home and abroad. Additional expenditure during the current year would accompany the installation of machinery and plant comprised in the amount of £400,000, and they anticipated some outgoings on building extensions. Despite the complications of the change-over, the output of their chief products had broken new records and continued to do so. Sales had also established new records, and during the first quarter of the current year the ratio of increase had been fully maintained.

The English Electric Co., Ltd., in a preliminary statement, reports a profit for the year ended 31st December last of £638,571, after providing £860,000 for taxation and £493,853 for depreciation. This compares with a profit of £535,027 for 1948. The consolidated profit applicable to the group is £709,194, after providing £1,045,625 for taxation and £678,241 for depreciation. It is proposed to pay a final dividend on the ordinary stock of 6 per cent, maintaining the distribution for the year at 10 per cent, less tax.

Lazard Brothers & Co. announce that stockholders subscribed for 96½ per cent of the recent "rights" issue of 589,789 £1 ordinary shares at 35s each in the proportion of one for six.

D. Napier & Son, Ltd., show a profit, after taxation and depreciation, of £55,343 for 1949, as compared with £53,890 for 1948. It is proposed to pay an ordinary dividend for the year of 7½ per cent.

Marconi's Wireless Telegraph Co., Ltd., reports a profit for 1949, after providing for taxation and depreciation of £140,483, as compared with £132,726 for 1948. It is proposed to pay a dividend on the ordinary shares in respect of the 53 weeks ended 31st December last of 7 per cent, less tax.

The Marconi International Marine Communication Co., Ltd.—After providing for depreciation and taxation there is a profit

for 1949 of £60,000 as compared with £58,327 for the preceding year. The final dividend is 5 per cent, making 7½ per cent, less tax, for the year.

International Combustion Holdings, Ltd., reports a net profit, before taxation, for the year ended 30th September last of £570,044, as compared with £454,419 for the preceding year. Taxation requires £341,738. The amount brought forward from the previous year of £95,486 was reduced during the year by £27,547 and with £500,000 transferred from general revenue reserve has been utilized in payment for the bonus issue of ordinary shares. It is proposed to pay a final dividend of 11 per cent on the ordinary capital as increased by the 150 per cent bonus issue in August last, making a distribution of 21 per cent, less tax, for the year (against 37½ per cent on the old capital in the previous year). A sum of £100,000 has been placed to general revenue reserve, and £118,758 is carried forward.

J. & E. Hall, Ltd., report a trading profit for the year ended 30th September last of £452,028, as compared with £293,462 for 1947-48, and a net profit of £113,831 (against £90,051). The final ordinary dividend proposed is 7½ per cent, maintaining the distribution for the year at 10 per cent. The balance carried forward is £284,893 (against £211,982 brought in).

The Oriental Telephone & Electric Co., Ltd., is paying an unchanged interim dividend of 4 per cent.

Taylor Tunnicliff (Electrical Industries), Ltd., is paying a dividend for the year of 15 per cent (unchanged).

NEW COMPANIES

Tide Electrical Co., Ltd.—Registered 10th February. Capital £1,000. Directors: L. W. R. Wratten and V. L. Martin. Secretary: T. A. Herbert, 128, Albany Street, N.W.1.

T. B. Hale, Ltd.—Registered 13th February. Capital £900. Repairers of electrical goods and installations, wireless and television sets, etc. Directors: S. Collier, T. B. Hale and C. Collier. Regd. office: 19, Grace Road, Ellesmere Port, Cheshire.

Winston Electronics, Ltd.—Registered 10th February. Capital £10,000. Directors: F. W. Reynolds and R. F. Laurence. Regd. office: 1, Park Road, Hampton Hill, Hampton, Middlesex.

Radionics, Ltd.—Registered in Dublin 31st January. Capital £10,000. Electricians and dealers in electrical, mechanical and radio products, etc. Directors: Mrs. Muriel S. Brownlee and G. Brownlee, both of 105, The Rise, Mount Marrion Park, Blackrock, Co. Dublin.

A. R. Mitchell (Shrewsbury), Ltd.—Registered 8th February. Capital £3,000. Electrical engineers, wireless, electronic and mechanical engineers, etc. Directors: A. R. Mitchell (chairman) and J. E. Rogers. Regd. office: 32, St. John's Hill, Shrewsbury, Salop.

C. T. Chapman (Reproducers), Ltd.—Registered 2nd February. Capital £500. Manufacturers and repairers of and dealers in radio, television, electronic, acoustic and magnetic devices, etc. Directors: C. T. Chapman and Constance E. Chapman. Regd. office: Riley Works, Riley Street, Chelsea, S.W.10.

INCREASES OF CAPITAL

Concordia Electric Safety Lamp Co., Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £100,000. At June 24, 1949, British Anthracite Sales, Ltd., held 99,996 £1 shares out of 100,000 issued.

Chloride Batteries, Ltd.—Increased by £1,499,900, in £1 ordinary shares, beyond the registered capital of £100.

Berry Hill (Engineers), Ltd.—Increased by £25,000 in 10,000 redeemable preference shares and 15,000 ordinary shares of £1 each beyond the registered capital of £25,000.

LIQUIDATIONS

Palace Electrical Co., Ltd.—Winding up voluntarily. Joint liquidators, Mr. M. S. Josephs, 36, Southampton Street, Strand, W. C. 2, and Mr. A. W. Hunter, 185-188, High Holborn, W. C. 1.

Electrical Facilities, Ltd.—Members' voluntary liquidation. Particulars of claims by 18th March to the liquidator, Mr. P. Ewen, 17, St. Helen's Place, London, E.C.3.

BANKRUPTCIES

J. W. Watson, 154, Aldborough Road, Seven Kings, Essex, electrical engineer.—Last day for receiving proofs for dividend 4th March. Trustee, Mr. C. T. Newman, 3, Central Buildings, Matthew Parker Street, Westminster, S.W.1, Official Receiver.

A. Smith and **J. Smith,** formerly carrying on business in co-partnership at 550, Bolton Road, Pendlebury, Lancs, as J. & A. Smith, electrical contractors.—Public examination 15th March at the Court House, Encombe Place, Salford.

STOCKS and SHARES

As the result of the General Election is likely to exert a considerable influence over prices of Stock Exchange securities, there is not much point—writing on the eve of the announcement—in setting out, or commenting upon price movements that may be sharply reversed in the course of the next day or so. In advance of the election, however, the general tendency of the Stock Exchange markets was firm, gilt-edged stocks and industrial ordinary shares being in good demand. On the assumption that the Government would be defeated and that with the Conservatives in power the scope for capital appreciation in ordinary shares would be increased, there was a steady flow of money into industrial ordinary shares.

Cable and Wireless Scheme

Satisfaction with the Cable & Wireless (Holding) amended scheme of reconstruction can be measured by the advance in the price of the ordinary stock from about 230, just after the first scheme was rejected last November, to 274½ now. The new proposals go far to satisfy the chief objections to the first plan, which gave too little to please the ordinary stockholder preferring to liquidate his investment rather than to remain interested in the continuing investment trust business. This time, he is offered for each £100 stock held, £125 3 per cent Savings Bonds 1065/75, together with either £180 new ordinary stock, or the equivalent (in whole or part) in a 3½ year loan stock.

Value of Cable Ordinary

As markets stand, £125 of Savings Bonds is worth about 115, or rather more. Taking the other stock to be worth par, holders should be able to realize about £295 for each £100 present stock. The difference of some 20 points between this figure and the market price of 274½ leaves a margin for dealing expenses, for a possible discount on the new stocks, and for the risk of a second failure to secure approval for the plan. For the preference shareholders, the offer is as before, with the additional alternatives of conversion into the new ordinary stock, or of accepting a 4 per cent loan stock. The price of the preference is rather harder at 101¼.

English Electric Results

As promised in the prospectus accompanying the company's recent debenture issue, English Electric's earnings made an impressive advance in 1949. Group profit, after tax and depreciation, was more than £100,000 above the previous year's figure of £596,000. Taking into account the increase in the tax provision to over a million, and a higher depreciation charge, the gross trading profit has risen by practically one-third. With the dividend held down to the usual 10 per cent, the handsome surplus of earnings attracted the attention of the pre-election hunt for highly conservative distributions. The premium on the 4 per cent debentures hardened to 3¼ points on the issue price of 99.

International Combustion

This company's final dividend of 11 per cent is equivalent to last year's 27½ per cent on the capital as it was before the 150 per cent share bonus. With the 10 per cent interim payment reduced in the same proportion, the total for 1948/9 equals 15 per cent. At 16s 6d the 5s shares were paying a little over 4½ per cent on the money. Net profits, before tax, were up by £115,000.

Calcutta Electric

Dealings began last week in the Calcutta Electric Corporation's new 5 per cent debentures at a discount of 2 points on the price of 98, at which £3 million stock was publicly offered. The issue came up against an unfavourable combination of circumstances, including General Election apathy, an undecided gilt-edged market and reports of disturbances in the Calcutta area. The bulk of the issue consequently went to the underwriters, and is believed to be in strong hands. By contrast, the £2 million stock issued locally was over-subscribed.

Newton Brothers (Derby)

The financial year of Newton Brothers (Derby), Ltd., ends with March and it will be interesting to see if the recent doubling of the ordinary share capital will in any way affect the relative rate of dividend, which for the past four years has been 25 per cent on the company's 2s shares. Last October, a bonus issue was made of one share for each ordinary share held, and the price to-day is 4s to 4s 3d. At the latter figure, presuming the dividend is 12½ per cent on the new capital, the yield on the shares would be 6 per cent on the money.

NEXT WEEK'S EVENTS

Monday, 27th February

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Radio Group. "Magnetic Amplifiers," by A. G. Milnes.

BRISTOL.—Electricity House, Colston Avenue, 6 p.m. I.E.E. Western Supply Group. "Load Dispatching and the Reasons for it, with special reference to the British Grid System," by A. R. Cooper.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Utilization Group. "Water Works Power-Plant Practice: The Comparative Costs of Steam-, Diesel- and Electrically-Operated Machinery," by T. P. Wakeford.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. Discussion on "Mobile Radio Power-Packs," opened by Air-Commodore R. L. Phillips.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Fault-Throwing Tests on the 132kV Grid System under Normal Working Conditions," by W. Casson and F. H. Birch.

SHEFFIELD.—At the Sheffield Metallurgical Club, 198, West Street, 7.30 p.m. Junior Institution of Engineers, Sheffield & District Section. "Mechanical Aids in the Operation of Rolling Mills," by J. S. Mayne.

Tuesday, 28th February

CAMBRIDGE. — Cambridgeshire Technical College, 6 p.m. I.E.E. Cambridge Radio Group. "A Survey of the Possible Applications of Ferrites," by Dr. K. E. Latimer and H. B. MacDonald.

COVENTRY.—Coventry Electric Club. "Television," by G. H. Watson.

LUTON.—Chamber of Commerce, George Street West, 7.30 p.m. Luton Electrical Society. "The A.C. Commutator Motor," by O. B. Charlton.

MANCHESTER.—Engineers' Club, Albert Square, 7 p.m. I.E.E. North-Western Centre. Fifth annual University Lecture on "Radio Astronomy," by Dr. A. C. B. Lovell.

Wednesday, 1st March

BELFAST.—Belfast Association of Engineers. "Electrode Steam Raising Boilers," by J. A. Tolien.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre. Lecture on "Some Electromagnetic Problems," by Prof. G. W. O. Howe.

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. Three short papers on "Some Engineering Problems in Aircraft Design."

MIDDLESBROUGH.—Cleveland Scientific & Technical Institute, 6.30 p.m. I.E.E. Tees-side Sub-Centre. Conversazione and address by T. E. Daniel, chairman of the North-Eastern Centre.

NEWCASTLE-ON-TYNE.—Minor Durant Hall, Oxford Street, 6.15 p.m. I.E.S. Newcastle Centre. "Floodlighting Practice," by M. W. Peirce.

SOUTHAMPTON.—University College, 6.30 p.m. I.E.E. Southern Centre. "Technical Considerations affecting the Development and Design of Electrical Control Gear for Machine Tools," by A. R. H. Thorne.

Thursday, 2nd March

BRISTOL.—Electricity House, 7 p.m. I.E.E. Bristol Students' Section. Joint "Brains Trust" with the Institution of Mechanical Engineers (Graduate Section).

CARDIFF.—South Wales E.B. Demonstration Theatre, The Hayes, 5.45 p.m. I.E.S. Cardiff Centre. "Lighting for Sports and Games," by D. E. Beard.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "Some Electrical Methods of Measuring Mechanical Quantities." F. J. Woodcock. (Measurements Section paper.)

At the Royal Society of Arts, Adelphi, 6 p.m. Institution of Engineering Inspection. "Present Tendencies in Production Engineering," by W. C. Puckey.

Friday, 3rd March

BATH.—S.W.E.B. Showrooms, 7 p.m. I.E.S. Bath & Bristol Centre. "Lighting of the Brabazon and Hangar," by L. M. Robertson.

BIRMINGHAM.—Grand Hotel, 6.30 for 7 p.m. Birmingham Electric Club. Annual dinner.

HUDDERSFIELD. — Electricity Showrooms, Market Street, 7.15 p.m. I.E.S. Huddersfield Group. "Some Notes on Industrial Lighting," by W. Imrie-Smith.

LONDON.—At the Institute of Marine Engineers, 85-88, The Minories, E.C.3, 6.30 p.m. Engineer Surveyors' Association, London Branch. "Electricity Regulations and their Applications," by F. Clarke.

Saturday, 4th March

LONDON.—I.E.E. London Students' Section, 10 a.m. Visit to the Royal Opera House, Covent Garden, W.C.2.

I.E.E. North Midland Centre

The annual dinner and dance of the North Midland Centre of the Institution of Electrical Engineers will be held on 17th March at the Grand Hotel, Harrogate. Tickets (25s each, 50s double, and for students and graduates, 17s 6d each, 35s double) can be obtained from Mr. F. A. Ellis, "North Landing," Gernhill Avenue, Fixby, Huddersfield.

Batti-Wallahs' Society

The annual ladies' night dinner and dance of the Batti-Wallahs' Society will be held on 13th March at the Café Royal, Regent Street, London, W.1. Tickets will be £2 2s each, and applications should be made to Mr. A. H. Hughes, hon. secretary and treasurer, 37, Southfields Road, London, S. W. 18. Members are asked to notify Mr. Hughes as early as possible whether they intend to be present and the number of tickets they will require.

Electrification Progress

Resumption of Work on the Manchester-Sheffield Scheme

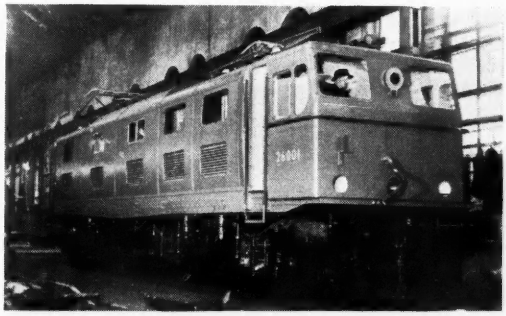
IN 1936 the directors of the former L.N.E. Railway approved a scheme for electrifying the whole of the line from Manchester (London Road) to Sheffield, Rotherwood Sidings, together with the branches to Manchester (Central) via Followfield, Glossop and Wath (see *Electrical Review*, 13th November, 1936, p. 689).

The scheme had to be suspended at the outbreak of war in 1939, when preliminary work was already well in hand. Structures for carrying the overhead wires had been erected for some miles, work had been started on the new motive power depot at Darnall and orders had been placed for the rolling stock, locomotives, cables, sub-station and overhead-line equipment. It was not until the late summer of 1947 that the Minister of Transport consented to the resumption of the scheme.

On making a tour of the principal routes last week we saw evidence of work that is now in hand for the resumption of the scheme in four stages: Wath-Dunford; Dunford - Manchester (London Road), including the Glossop branch and Reddish depot; Sheffield, Rotherwood Sidings-Barnsley Junction; and finally Fairfield Junction-Manchester (Central).

The distinguishing feature of the plan is that all classes of traffic will be electrically hauled, thereby constituting the first British example of a completely electrified railway service, the lines involved covering some 75 miles of route and a total of 330 miles of track. Little or no electrical equipment has been installed yet but preparatory work is reaching an advanced state and it will not be long before the overhead lines, sub-stations and so on are erected.

The electricity supply will be delivered by the B.E.A. at 33 kV to traction sub-stations at Gorton, Neepsend and Oldham Junctions. These points of supply will be interconnected by cable routed alongside



The first mechanical parts of this 1,360 h.p. locomotive have just been completed at the Gorton works of British Railways

Pre-stressed concrete bridges replace many of the old arches to provide clearance for the overhead lines, the supports of which are adjustable in certain places because of possible subsidences due to colliery workings beneath

the track, which will also loop into the other traction sub-stations, and by this means alternative supplies will be available in the event of a breakdown.

Each of the eleven traction sub-stations which are now being built will house 33 kV switchgear for controlling the primary supply, steel tank pumped mercury arc rectifiers to supply 1,500 V d.c. for delivery to the overhead conductors, d.c. switchgear, control and auxiliary apparatus. The total capacity of converting equipment in the sub-stations will be 47,500 kW. Additional d.c. switchgear is to be installed in track sectioning cabins about half-way between each two sub-stations to facilitate sectioning of the overhead line and to give protection in the event of faults. Sub-stations and track sectioning cabins will normally be unattended but under remote supervisory control from the control station at Penistone. The main contractors for the sub-stations are Bruce Peebles & Co., Ltd., and for the cables W. T. Henley's Telegraph Works Co., Ltd.

The overhead line equipment will be similar to that used on the Manchester-Altrincham and Liverpool Street-Shenfield schemes, the contractors being British Insulated Callender's Cables, Ltd. Certain portions of the track, however, are liable to subsidence on account of colliery workings underneath them so special structures have been erected at those sites on which the bridge member can be adjusted to allow for any alteration in level.

Locomotive Construction

Motive power for the bulk of the electrification will be provided by 85 mixed traffic electric locomotives, but the local passenger services between Manchester (London Road), Hadfield and Glossop will be provided by eight three-coach multi-unit trains. This will increase the annual train mileage in these local services by about 48,000 miles.

Two types of locomotive will be used, the mechanical parts of which are being built by the railway at its Gorton works; the electrical equipment will be installed at Dukinfield by the Metropolitan-Vickers Electrical Co., Ltd. Fifty-eight will be of the double-bogie four-motor, four-axle type having a continuous rating of 1,360 h.p. at 56 m.p.h. and a one-hour rating of 1,868 h.p. at 45 m.p.h.

The prototype of this locomotive was completed at Doncaster in 1941 by the former L.N.E.R. and has been running since September, 1947, in normal service on the Netherlands Railways. This experience has enabled improvements to be incorporated in subsequent locomotives, the first mechanical parts of which have just been completed at Gorton. The first locomotive should be ready by July and the remainder are scheduled to be completed at the rate of three per month.

The remaining 27 locomotives, the construction of which will follow, will be of the double-bogie six-motor, six-axle type having a continuous rating of 2,298 h.p. at 46 m.p.h. and a one-hour rating of 2,490 h.p. at 44.3 m.p.h. The performance of the two types will be identical on the lower speed combinations and both will handle the heaviest freight trains.

The multiple-unit stock will be identical with that on the Liverpool Street-Shenfield line except that first- and third-class accommodation will be provided. The coaches are being built by the Metropolitan-Cammell Carriage & Wagon Co., Ltd., and the electrical equipments are being supplied and erected by the General Electric Co., Ltd.

Signalling System

With regard to signalling, the existing d.c. track circuits are to be converted to the a.c. type, and distant signals on the main lines are to be moved out to give increased braking distances and converted to the colour light system. The conversion of the track circuits will be carried out partly by a contract let before the war to the Siemens & General Electric Railway Signal Co., and partly by the Railway Executive's own staff.

Good progress has been made in a number of civil engineering works connected with the scheme, a notable example being the three-mile-long double-line tunnel through the Pennine Range from Woodhead to Dunford Bridge on the main line. This will replace an existing old single-line tunnel, the maintenance of which had become very costly, and is expected to result in a 25 per cent increase in the number of trains operated. The rails in the new tunnel will have a much longer life as a result of electrification as atmospheric pollution by steam locomotives will be avoided.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

10079. Standard Telephones & Cables, Ltd., Earp, C. W., and Levy, M. M.—Multi-channel electrical pulse communication systems. 5th April, 1945. (635472.)

16039. Standard Telephones & Cables, Ltd., and Levy, M. M.—Multi-channel electrical communication systems utilizing distributors. 23rd July, 1945. (635473.)

18898. Standard Telephones & Cables, Ltd., and Levy, M. M.—Thermionic multi-vibrators for use in multi-channel electrical pulse communication systems. 6th July, 1945. (635474.)

19343. Standard Telephones & Cables, Ltd., and Levy, M. M.—Multi-channel electrical pulse communication systems. 16th July, 1945. (635475.)

24611. Telephone Manufacturing Co., Ltd., and Ellis, C. F.—Sealed containers whose contents are liable to differential expansion and contraction in relation to the container, such as electrical apparatus immersed in a liquid or semi-liquid. 8th December, 1944. (635541.)

1945

9638. Standard Telephones & Cables, Ltd., and Levy, M. M. — Distributor arrangements for multi-channel communication systems. 17th April, 1945. (635476.)

12118. Standard Telephones & Cables, Ltd., and Levy, M. M.—Multi-channel time-modulated pulse communication systems. 14th May, 1945. (635477.)

17316. Mozzanini, G. G., and Lebertre, M.—Electric motor control systems. 6th July, 1945. (635681.)

23332. British Thomson-Houston Co., Ltd.—Magnetrons. 10th September, 1945. (635479.)

24790. British Thomson-Houston Co., Ltd.—Electrically heated ovens. 25th September, 1945. (635682.)

27834. Submarine Signal Co.—Direction determining systems. 22nd October, 1945. (635544.)

1946

2384. British Thomson-Houston Co., Ltd.—Methods of and apparatus for bending tubular glass articles. 24th January, 1946. (635545.)

7532. British Thomson-Houston Co., Ltd., and Griffiths, L.—Dynamo-electric machines. 18th March, 1947. (635684.)

10478. Compagnie Générale d'Electricité.—Transmission system using carrier currents. 4th April, 1946. (Cognate application 10479, 4th December, 1943.) (635481.)

12053. Standard Telephones & Cables, Ltd.—Electric multi-channel pulse modulator systems. 18th April, 1946. (635482.)

12277. Du Mont Laboratories, Inc., A. B.—Television receivers. 23rd April, 1946. (635547.)

17200. Philco Corporation.—Electrical cavity resonators and devices incorporating such resonators and the production of electrical oscillations. 6th June, 1946. (635687.)

20770. Metropolitan-Vickers Electrical Co., Ltd., and Robinson, E. Y.—Thermionic valves. 11th August, 1947. (635480.)

22884. General Electric Co., Ltd., Brittain, F. H., and James, E. G.—Crystal rectifiers. 8th February, 1949. (635690.)

29361. Standard Telephones & Cables, Ltd., and Strong, C.E.—Radio navigation systems. 26th September, 1947. (635487.)

31119. Marconi's Wireless Telegraph Co., Ltd., and Green, E.—Transformer and coupling circuit-arrangements. 30th July, 1947. (635561.)

34087. Standard Telephones & Cables, Ltd.—Multi-channel electric pulse communication systems. 18th November, 1946. (635488.)

35225. British Thomson-Houston Co., Ltd.—Overload protective devices for liquid insulated electrical apparatus. 27th November, 1946. (635489.)

35363. Scophony, Ltd., and Franklin, D. P.—Electrical logarithmic converters. 8th January, 1948. (635562.)

1947

232. General Electric Co., Ltd., and Humphreys, O. W.—Electric heating apparatus. 1st January, 1948. (635613.)

299. Soc. Française Radio-Electrique.—Manufacture of bases for electric lamps, vacuum tubes and the like. 3rd January, 1947. (635700.)

971. Standard Telephones & Cables, Ltd., and Cleaver, R. F.—Radio direction finding systems. 9th January, 1948. (635701.)

2664. British Thomson-Houston Co., Ltd., Wells, R. S., and Blood, W. R.—Production of luminescent screens. 21st July, 1948. (635491.)

3118-9-20. Round, H. J., and Buckingham, J.—Magnetostriction oscillators. 1st February, 1947. (635704-5-6.)

3319. Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—Method of and arrangement for scrambling signals in multi-channel systems. 4th February, 1947. (635707.)

3831. Philips Lamps, Ltd.—Glow-discharge tubes. 10th February, 1947. (635709.)

5209. Radio Corporation of America. — Coupling arrangements for electrical resonators. 21st February, 1947. (635619.)

5834. Standard Telephones & Cables, Ltd.—Mechanical oscillograph indicator. 28th February, 1947. (635711.)

6121/2. Voigt, P. G. A. H.—Magnets. 4th March, 1948. (635494/5.)

6495. Radio Corporation of America.—Television and like pick-up or camera cathode-ray tubes. 7th March, 1947. (635712.)

9483. Simms Motor Units, Ltd., Sanders, J. C. M., and Garland, R. L.—Vibrating contact voltage and current regulators. 9th April, 1947. (635714.)

9715. Standard Telephones & Cables, Ltd.—Electron-discharge devices of the magnetron type. 11th April, 1947. (635574.)

10384. General Electric Co., Ltd., and Reik, H.—Voltmeters incorporating dry-plate rectifying devices. 15th April, 1948. (635715.)

10584. Vaughan, R. C.—Electric motors. 2nd April, 1948. (635624.)

11468. Everett, Edgcumbe & Co., Ltd., and Ockenden, F. E. J.—Electric clock systems for ships. 19th April, 1948. (635578.)

11569. Atlas Powder Co.—Electric explosion initiators. 30th April, 1947. (635716.)

11762. Martin, H., and Slater, I. G.—Stud welding. 27th April, 1948. (635625.)

12212. Philco Corporation.—Radio frequency amplifier circuits. 6th May, 1947. (635579.)

12760. Vaughan, R. C.—Electric motors. 19th January, 1948. (Cognate application 16360, 20th June, 1947.) (635626.)

12971. International Resistance Co.—Resistor construction. 14th May, 1947. (635719.)

13767. Superheater Co.—Steam generators. 22nd May, 1947. (635721.)

15399. British Thomson-Houston Co., Ltd.—Methods of preparing a monoethyldibenzofuran. 11th July, 1947. (635631.)

15400. British Thomson-Houston Co., Ltd.—Methods of preparing vinyldibenzofuran. 11th June, 1947. (635632.)

19480. Metropolitan-Vickers Electrical Co., Ltd., and Simpson, W.—Manufacture of alkoxy silanes. 2nd March, 1948. (635726.)

19928. Telefonaktiebolaget L. M. Ericsson. — Switching devices comprising switch steps with primary and secondary selectors for automatic telephone systems. 24th July, 1947. (635727.)

20484. Doane Products Corporation.—Luminairs for multiple fluorescent lamps. 29th July, 1947. (635728.)

20989. Western Electric Co., Inc.—Radio receiving systems. 1st August, 1947. (635590.)

21821. Electroflo Meter Co., Ltd.—Fluid seals. 8th August, 1947. (635731.)

21837. Allmanna Svenska Elektriska Aktiebolaget.—Voltage regulator with self-magnetized transductor. 8th August, 1947. (635636.)

21938. General Electric Co., Ltd., Power, E. B., and Nelson, E. H.—Seal-bodies in which a conductor is sealed through a vitreous wall. 4th August, 1948. (Cognate application 24097, 1st September, 1947.) (635593.)

23766. Thorn Electrical Industries, Ltd., and Kember, R. C.—Fittings for tubular electric lamps. 19th August, 1948. (635734.)

26607. Trico Products Corporation.—Electromagnetic switches. 2nd October, 1947. (635638.)

27074. Landis & Gyr Soc. Anon.—Electric remote control devices or switches. 8th October, 1947. (635605.)

28759. General Electric Co., Ltd., and Hildred, J. T. —Electric light fittings. 19th October, 1948. (635743.)

30043. Standard Telephones & Cables, Ltd., and Levy, M. M.—Multi-channel electric pulse communication systems. 6th July, 1945. (Divided out of 635474.) (635509.)

30444. Steatite & Porcelain Products, Ltd., Woodcock, J., and Paridge, J. K.—Ceramic dielectrics comprising essentially titania. 15th November, 1948. (635746.)

30993. Battery Construction, Ltd., and Acreman, H. F.—Electric accumulators. 5th April, 1948. (635642.)

31195. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Electronic control apparatus. 20th October, 1948. (635643.)

31271. Siemens Bros. & Co., Ltd., and Humphries, H. E. — Telephone systems. 29th October, 1948. (635644.)

33874. Communications Patents, Ltd., and Spooner, D. J.—Keying systems for radio-frequency electric wave transmitters. 24th January, 1949. (635650.)

34242. Berthier, E. A.—Automatic electric circuit-breaker. 24th December, 1947. (635516.)

1948

895. Hoover, Ltd.—Suction cleaners. 12th January, 1948. (Addition to 572066.) (635655.)

1238. Arkless, R. S.—Electrically heated gas gun or torch. 19th August, 1948. (635657.)

1447. British Thomson-Houston Co., Ltd.—Magnetic cores. 16th January, 1948. (635658.)

1482. Will, C., and Hoyles, L.—Snap-action electric switch. 16th January, 1948. (635659.)

1569. Syntron Co.—Intermittent current operated reciprocating motors. 19th January, 1948. (635660.)

2805. English Electric Co., Ltd., and Mitchell, A. B.—Gas turbine plant. 21st January, 1949. (635665.)

5564. Compagnie Industrielle des Téléphones.—Devices for measuring the harmonics produced in electrical equipment. 25th February, 1948. (635518.)

6761. Westinghouse Electric International Co.—Electric conductors. 4th March, 1948. (635671.)

8556. Marconi Instruments, Ltd., and Brocklesby, C. F.—Wheatstone bridge resistance measuring circuits. 28th October, 1948. (635674.)

8613. Forges et Ateliers de Constructions Electriques de Jeumont, and Teszner, S.—Lighting arrestors. 24th March, 1948. (635675.)

9173. Rushworth, D.—Apparatus for supplying electric power to electrically driven reciprocating carriages and/or apparatus carried thereby. 30th April, 1949. (Cognate application 18611, 10th July, 1948.) (635402.)

9284. Walters, A. E.—Combined table and lamp. 31st March, 1949. (635408.)

9390. Holding Intercito Soc. Anon.—Feeding apparatus for electrode rods. 2nd April, 1948. (Addition to 589543.) (635411.)

9478. Scaife, F. N., and Buckingham, J.—Variable electrical condensers. 5th April, 1948. (635415.)

9547. Vaughan Crane Co., Ltd., and Sadler, G. V.—Controllers for electric motors. 11th March, 1949. (635417.)

9664. Philips Electrical, Ltd., Pinkney, A. J., and Richards, J. H. — High-frequency induction heating apparatus. 6th May, 1949. (635421.)

10001. Edison Swan Electric Co., Ltd., and Fent, J.—Fittings for tubular elongated light sources. 9th April, 1948. (635431.)

10103. Siemens Bros. & Co., Ltd., and Rosen, A.—Electrical cables for telecommunication purposes. 6th May, 1949. (635434.)

10173. Distillation Products, Inc.—Heating of rotating workpieces by electromagnetic induction. 13th April, 1948. (635436.)

10211. Rotax, Ltd., and Millns, T. W.—Commutators for dynamo-electric machines. 5th April, 1949. (635440.)

10266. General Electric Co., Ltd., and Scattergood, E. W.—Apparatus for the manufacture of hollow glass articles. 13th April, 1949. (635441.)

10274. Telegraph Construction & Maintenance Co., Ltd., and Smith, E. W.—Electric conductor and cable and method of jointing same. 24th March, 1949. (Cognate application 12420, 5th May, 1948.) (635442.)

10339. Akt.-Ges. Brown Boveri & Cie.—Device for making a vacuum-tight connection between two metallic parts at different electric potentials. 14th April, 1948. (635444.)

10359. Westinghouse Electric International Co.—Insulated electrical conductors. 14th April, 1948. (635445.)

10575. Standard Telephones & Cables, Ltd., and Weston, W. K.—Tubular electrical conductors and the manufacture thereof. 14th April, 1949. (635449.)

10642. Metropolitan-Vickers Electrical Co., Ltd., and Gardner, T. L.—Combustion chambers. 17th March, 1949. (635450.)

10743. New Day Electrical Accessories, Ltd., and Davey, L. E. W. C. N.—Junction, switch, terminal or like boxes for electric wiring systems. 19th May, 1949. (635452.)

11014. General Electric Co., Ltd., and Fairweather, D. W.—Electric plug-and-socket couplings. 21st April, 1949. (635462.)

11015. General Electric Co., Ltd., and Fairweather, D. W.—Electric contacts, terminals and the like. 21st April, 1949. (635463.)

11238. British Thomson-Houston Co., Ltd.—Clamping devices. 23rd April, 1948. (635467.)

11282. Wild-Barfield Electric Furnaces, Ltd., British Industrial Plastics, Ltd., and Collins, G. T.—Induction heating of ferrous articles such as moulds. 8th April, 1949. (Addition to 566128.) (635470.)

11412. Radio Gramophone Development Co., Ltd., and Parkinson, W. R.—Means for showing the position of a rotary knob of an electric switch or other device. 26th April, 1949. (Addition to 619842.) (635522.)

11450. Painton & Co., Ltd., and Benham, C. M.—Magazine-type electric fuse holders. 14th April, 1949. (635524.)

11543. General Electric Co., Ltd., and Pye, J. F.—Electric fuse holders. 5th May, 1949. (635525.)

11546. Fielden (Electronics), Ltd., and Witcombe, L.—Electrical transformers. 13th May, 1949. (635526.)

11593. Ekco-Ensign Electric, Ltd., and Stickley, W. A.—Circuit arrangements for electric-discharge lamps. 30th April, 1949. (635528.)

11890. General Electric Co., Ltd., and Cranston, W. M.—Fans. 6th April, 1949. (635536.)

11950. Hunt, Ltd., A. H., Brewell, S. H., and Richmond, F. S.—Manufacture of electrical capacitors. 29th April, 1949. (635537.)

12024. Santon, Ltd., Trevelyan, R. J., and Haworth, R.—Contact members for rotary electric switches. 30th April, 1949. (635538.)

Amended Specification

590372. Standard Telephones & Cables, Ltd., and others.—Electric signalling systems.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—8th March. State Electricity Commission of Queensland. Electrical line construction material. (C.R.E. (I.B.) 42981/50. Ten/993.)*

MELBOURNE.—5th April. State Electricity Commission. Supply of 28 electrically operated overhead travelling cranes. (See this issue.)

Belfast.—18th March. Electricity Department. Switchgear and accessories. (See this issue.)

Cannock.—15th March. U.D.C. Electrical equipment for one year. E. Lomax, surveyor, Council House, The Green.

Cleethorpes.—2nd March. Town Council. Wiring installations in 56 houses, Love Lane Corner and Highgate housing sites. A. B. Cooper, borough engineer, Council House.

Coulsdon and Purley.—1st March. U.D.C. Fluorescent lighting fittings for Council offices. (See 17th February issue.)

Greece.—ATHENS.—9th March. State Railways. Telephone apparatus and materials, steel accessories, poles, etc. (C.R.E. (I.B.) 43578/50. Ten/1111.)*

India.—NEW DELHI.—15th March. Director General of Industries & Supplies. Insulated cables for the year ending 31st March, 1951. (C.R.E. (I.B.) 43576/50. Ten/1000.)*

Longbenton.—13th March. U.D.C. Electrical installations for various housing schemes. (See this issue.)

Manchester.—10th March. Education Committee. Electrical installation in Old Hall Drive Secondary School, Gorton. (See 17th February issue.)

New Zealand.—WELLINGTON.—9th May. State Hydro-Electric Department. One 25-ton electric overhead travelling crane. (C.R.E. (I.B.) 42173/50. Ten/966.)*

Portuguese East Africa.—LOURENCO MARQUES.—Directorate General of Colonial Development. Additions and amendments to the specifications for a new electrical distribution system are now available. (C.R.E. (I.B.) 33760/49. Ten/813C.)*

Slough.—13th March. Corporation. One motor tower wagon. Street lighting equipment. (See this issue.)

South Africa.—JOHANNESBURG.—30th March. South African Railways. Two goods elevators. (C.R.E. (I.B.) 43490/50. Ten/1113.)*

Stepney.—15th March. Borough Council. Three passenger lifts for flats, Bancroft Road area, Borough surveyor, Duval Street, London, E.1.

Uruguay.—MONTEVIDEO.—6th March. Direccion General de Comunicaciones. Microtelephones and induction coils. (C.R.E. (I.B.) 43735/50. Ten/1006.)*

26th May. Usiñas Electricas y Telefonos des Estado. Automatic telephone equipment. (C.R.E. (I.B.) 43765/50. Ten/1005.)*

Westhoughton.—6th March. U.D.C. Electric lamps for one year. F. H. Walker, surveyor, Town Hall.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

ORDERS PLACED

Doncaster.—Transport Committee. Supply of 16 miles of cadmium copper trolley wire (£4,260).—B.I. Callender's Cables, Ltd.

Oxford.—Regional Hospital Board. Electrical installation at Borocourt Institution (£3,000).—Southern Electricity Board.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashton-under-Lyne. — Works extensions; National Gas & Oil Engine Co., Ltd., Wellington Works.

Birkenhead.—Office and stores at 25, Oxten Road, for James McKenzie, Ltd.; architects, R. Owens & Sons, 11, Westminster Chambers, Liverpool.

Blackpool.—Proposed maternity and child welfare clinic at St. Walburga's Road; A. S. Hamilton, borough engineer.

Bolton.—Adaptation of premises at Castle Street as social centre for blind; Gilbert Collier & Son, 247, Ashworth Lane. Adaptation of Egerton Lodge as hostel for aged; F. Hutchinson & Senior, 22, Queen Street, Farnworth. 29 houses at Leonard Street; F. Pardon, Ltd., Glebe Street.

Bootle.—Flats (24) at Gaisworthy Avenue for B.C.; Hawthorne Building & Construction Co., Ltd., Vulcan Street.

Bournemouth.—Houses (115), Kinson estate, for B.C.; borough architect. Rebuilding retail store, 18-20, Commercial Road; F. W. Woolworth & Co., Ltd., 1, New Bond Street, W.1.

Brandon.—Weaving and spinning factory for Hirst & Thackway, Ltd.

Brighton.—Re-erection and extensions of laundry; Palmerston Laundry, Ltd., 15, Hollingdean Terrace. Licensed premises, with restaurant, etc., Kings Road; Edlins, Ltd., 31, York Place.

Brixworth.—Houses (60) on various sites; F. A. Russell, surveyor.

Cardiff.—Four blocks of four-storey two bedroom maisonettes, Jubilee Street, Grangetown, for T.C.; city surveyor.

Chadwell Heath.—Branch post office, Tudor Parade; Hammond & Miles, Ltd., builders, Scrafton Road Works, Ilford.

Cheltenham.—Houses (150), Hester's Way estate, for T.C.; borough surveyor. Showrooms, offices and flats, 18-22, Suffolk Road; Leckhampton Estates, Ltd., 76, Portland Street.

Chester.—Community centre at the Lache estate; C. Greenwood, city surveyor.

Coventry.—Factory for T. Bushill & Sons, Ltd.; A. Matts & Sons, Ltd., builders, Vecqueray Street. New wholesale market; D. E. E. Gibson, city architect. 114 flats, Allesley estate, for T.C.; city architect. Block of shops and flats, Sherbourne Street and Spon Street; W. S. Hattrell & Partners, architects, 1, Queens Road.

Cumberland.—Domestic economy kitchen at Newton Rigg Farm School for the C.C.; county architect, 15, Portland Square, Carlisle.

Dewsbury.—Secondary modern school at Earlsheaton; R. R. Alexander, borough architect.

Douglas (I.o.M.).—New nurses' home, Westmorland Road Hospital site; E. C. Kneale, secretary, Noble's Hospital.

Durham.—Adaptation of Ivy House, Sedgefield, as old people's hostel for the C.C.; county architect, Court Lane.

Falmouth.—Additions and extensions to Technical Institute (£133,000) for Cornwall E.C.; S. Gregson, county architect, County Hall, Truro.

Glasgow.—Houses (118), Milton district; W. Kerr, town clerk, City Chambers.

Godalming.—New nurses' home at King George's Sanatorium for Sailors; South Western Metropolitan Regional Hospital Board.

Hexham.—Adaptation of Hexham Hydro (£21,500); county architect, County Hall, Newcastle.

Hull.—Secondary school, Hedon (£290,000), for East Riding E.C.; county architect, Beverley.

Keighley.—Houses (74) at Brader Bank estate; E. Turner, Ltd.

Kinver.—Completion of County Secondary Modern School for Staffs E.C.; A. H. Guest, Ltd., Coalbourne Brook, Stourbridge.

Leeds.—Dwellings (256), Beckett Park estate, for T.C.; city architect, Priestley House, Quarry Hill.

London.—CITY.—Office block, Gt. Tower Street and Mark Lane; City of London Real Property Co., Ltd., 159, Fenchurch Street, E.C.3.

POPLAR.—Eight-storey block of 104 maisonettes, Abbott Road area, for B.C.; Farquharson & McMorran, architects, 14, North Audley Street, W.1.

ST. PANCRAS.—Three blocks of flats (44 dwellings), Willingham Terrace, for B.C.; borough surveyor.

TOTTENHAM.—Housing scheme, West Green Road, for B.C.; borough engineer.

WALTHAMSTOW.—New out-patients' department at Connaught Hospital, Orford Road, E.17; Adam, Holden & Pearson, architects, University of London, W.C.1.

Liverpool.—Extensions to City College of Commerce for E.C.; Wm. Hall & Sons, Ltd., 60, Christian Street.

Litherland.—Erection of Moss Lane junior and infants' school; H. Boot & Sons, Ltd., Liverpool.

Maghull.—Extensions to Hudson County School for Lancs E.C.; Tysons, Ltd., Liverpool.

Manchester.—Three-storey buildings, including 25 shops and 19 flats, at Palatine Road, Northenden, for Varley Estates, Ltd.; architects, J. Cotton & Partners, 18-20, Regent Street, London. Self-contained nursery wing adjoining Charlestown Road Primary School; city architect.

Matlock.—Houses (30) for U.D.C.; Wildgoose & Sons, Matlock.

Newcastle-on-Tyne. — Rebuilding Delaval Road Primary School; E.C. architect, 18, Cloth Market. Electric lighting, Council houses (£115,924); city architect. Workshop, Skinnerburn Road, for J. Herring & Co., timber merchants, Skinnerburn Road. Alterations for Newcastle Co-op. Society, Ltd., Chillingham Road; C.W.S. Architects' Dept. 90, Westmorland Road. Conversion of No. 5 Claremont Place into hostel for Newcastle United Hospitals, Queen Victoria Road; hospital governors. Mineral water factory, Sandyford Road, for R. Deuchar, Ltd.; S. H. Lawson, architect, Emerson Chambers, Blackett Street.

Penteland.—Conversion of Kirkley Hall into agriculture training centre; county architect, County Hall, Newcastle.

Reading.—Houses (200), Bath Road, for T.C.; borough architect. Bank premises, 5-7, Cheapside; National Provincial Bank, Ltd., 15, Bishopsgate, E.C.2.

Scarborough.—Showroom, Roscoe Street, for H. Pickup, Ltd.; Wilkinson & Smith, architects, Martins Bank Chambers.

Southampton.—Reconstruction of offices for the Automobile Association; Gutteridge & Gutteridge, architects, 45, Westwood Road.

INFORMATION DEPARTMENT

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Luxor" lighting fittings.

"C. & R." lampholder flashers.

"P.B." porcelain fuses.

"Arcon" or "Arcan" fluorescent fittings.

"Fitall" universal pencil-type elements.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.